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# The Great Basin Naturalist

VOLUME XIV, 1954

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VASCO M. TANNER. *Editor*

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AUG 10 1955



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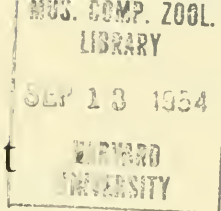
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## TINGIDAE: DESCRIPTIONS AND SYNONYMIC DATA (Hemiptera)

CARL J. DRAKE  
Ames, Iowa

This present paper contains the descriptions of new species, new synonymies and the transfer of several species of Tingidae to different genera. The measurements are such that 80 units equal one millimeter. The types have been deposited as stated beneath the descriptions.

### CERATINODERMA FORNICATA Stal

*Ceratinoderma fornicata* Stal, Enum. Hem., 3:117. 1873.

*Ceratinoderma fornicata* Distant, Ann. Mus. S. Afr., 2(9):240, 1 fig. 1902.

The following notes are based on the type, female, Caffaria, South Africa, (antennae missing), in the Naturhistoriska Riksmuseum, Stockholm. This is the only known specimen of the species.

Head short, rather broad, black, unarmed. Rostrum fuscous, darker at apex, reaching to base of mesosternum; laminae high on mesosternum, lower and more widely separated on metasternum. Bucculae broad, areolate, closed in front. Orifice not visible. Legs short, with femora incrassate, dark fuscous. Pronotum black, coarsely punctate, almost reticaceous, truncate in front, triangularly produced behind, with median carina barely distinct, concave, with collar and hind process both gradually elevated; paranota represented by a slight carina. Elytra (jointly with hind pronotal process) considerably arched longitudinally, with outer sides very strongly deflexed and thus entirely covering sides of abdomen, without trace of boundary veins separating subcostal, discoidal and sutural areas, without costal area; hypocostal laminae moderately wide, mostly uniseriate, a little wider at base, there two areolae deep, the areolae small; elytra dark fuscous, the areolae rounded; pronotum, head and femora lightly coated with grayish blue pruinose.

The longitudinally concave pronotum, longitudinally arched elytra (sides very strongly deflexed), feebly unicarinate pronotum and indistinct orifice separate this genus from *Serenthia* Spinola. *Coleopteroides* Philippi has a tricarinate pronotum and less arched elytra; orifice is also indistinct. *Lullius* Distant is more closely related to *Serenthia*.

PLESIONEMA **ETEOSA** Drake, n. sp.

Broadly ovate, testaceous with head pale brown and eyes reddish brown. Body beneath reddish fuscous with median part of venter testaceous. Head longly produced in front of eyes, moderately convex above, armed with nine rather long erect spines—a pair of spines just behind the inner hind margin of each eye, a spine at the centre of the vertex between the eyes, a pair a little in front of the eyes, a median spine in front of the latter, a third pair scarcely in front of the second median spine, and third median or anterior spine in front of the third pair (hind or first pair of spines more widely separated from each other than other two pairs). Antenniferous tubercles long, slightly divergent with tips a little bent outwardly, slightly shorter than first antennal segment; first antennal segment short, stouter and almost twice as long as second, both testaceous, last two segments missing. Rostrum very long, testaceous with apex embrowned, extending on second segment of venter. Bucculae long, testaceous, with ends contiguous in front. Orifice not visible. Hypocostal laminae long, composed of one complete row of small areolae.

Pronotum short, reticaceous, flat, truncate behind, unicarinate; median carina moderately elevated, extending entire length of pronotum and collar, composed of one row of small areolae; collar long, raised anteriorly, areolate, about one half as long as the main part of pronotum; paranota wide, slightly reflexed, mostly five areolae deep, with outer margin slightly roundly narrowed anteriorly, with a large spine on each antero-lateral angle. Elytra very little longer than abdomen, broadly ovate, with clear areolae; costal area wide, slightly turned up, almost entirely quadriseriate, slightly wider anteriorly; subcostal area very wide, subvertical, largely eight areolae deep; discoidal area long, with outer boundary more raised and rounded, with a transversely raised vein just in front of middle, six areolae deep in widest part; clavus small, with outer boundary not very clearly defined.

TYPE (*male*), Cape Recife, South Africa, 1942, Drake Collection.

On account of the armature of the head (armed with nine spines), it seems advisable to place this species in the genus *Plesionema* Drake, although the pronotum is unicarinate and the boundary veins of discoidal and adventitious veins of both subcostal and discoidal areas are scarcely raised. In *P. humeralis* (Distant), the pronotum is tricarinate, the paranota very differently shaped and the adventitious veins of elytra strongly elevated, areolate and quite numerous.

**PARACOPIUM GIGANTOS** Drake, n. sp.

Very large, fuscous-black with collar, median carina in front, paranota and widest part of costal area (veinlets of five areolae, the cells clear) reddish fuscous. Legs short, with femora moderately incrassate, blackish with apical half to three-fourths of tibiae and entire tarsi (including claws) reddish fuscous. Rostrum long, brown, almost reaching to end of sulcus; laminae testaceous, uniseriate. Ori-fice furnished with a long narrow sulcus with sides elevated. Bucculae closed in front. Antennae moderately long, stout; segment III distinctly gradually enlarged apically; III very long, thick, evenly enlarged, only slightly bent, on the same axis as III, longer than III, measurements—I, 32; II, 21; III, 48; IV, 55. Head blackish, eyes black; anterior spines thick, somewhat conical, turned inwardly with tips touching, resting on the surface of the head; median spines represented by a raised tubercle; hind spines long, slender, appressed, brownish testaceous, reaching to middle of eyes. Body beneath dark fuscous, more blackish on sterna.

Pronotum moderately convex, reticulous; carinae about equally elevated, each composed of one row of small areolae, the lateral pair slightly convex within in front of disc; paranota narrow behind; slightly wider in front, uniseriate along humeri, with a few extra cells in wider part opposite calli; hood raised, areolate; hind projection very long, areolate. Elytra long, with sides subparallel; costal area narrow, the transparent areolae with brownish veinlets in widest part larger; subcostal area wide, with four rows of small areolae, discoidal area large, extending beyond the middle, narrowed at both ends, widest at middle, there seven or eight cells deep, the areolae slightly larger than in subcostal; sutural area with areolae a little larger.



LENGTH, 6.25 mm.; width, 1.90 mm.

TYPE (*female*), Perinel, Province of Analamasotra, Madagascar, in Drake Collection. PARATYPE; 1 specimen, labeled 'Madagascar' collected by Grandidier, in 1874, Paris Museum.

The large size, color and markings, and the long fourth antennal segment (longer than the third) separate this insect from other African species of *Paracopium* Distant. The shortly pilose antennae as well as the shape and attachment of the fourth segment places this species in *Paracopium* rather than *Copium*.

NEW COMBINATIONS: A study of the types (in Congo Belge Museum, Tervuren, Belgium) of *Copium antennatum* Schouteden (Rev. Zool. Afr., 11:5, 1923), *C. bequaerti* Schouteden (p. 5), *C. ghesquierei* Schouteden (p. 6-7) and *C. lupakense* Schouteden (p. 7) show that these species are typical members of the genus *Paracopium* and are here so transferred.

*Catoplatus burgeoni* Schouteden (*loc. cit.*, p. 8) also belongs to the genus *Paracopium*, and has nothing to do with the genus *Catoplatus* Spinola. It is somewhat atypical of *Paracopium*, but fits better here than in any other genus. The antennae are very long, slender, shortly pilose, measurements—I, 30; II, 17; III, 172; IV, 45. The elytra are broad; costal area wide, mostly biseriate, triseriate in widest part.

DICONOCORIS **DISTANTI** Drake, n. sp.

*Elasmognathus greeni* Distant (not Kirby), Fauna Brit. India, Rhynch., 2:142, fig. 105 (in part). 1902.

Head black, armed with five long spines; anterior spines black, upright, divergent laterally with inner sides concave; median spines upright, black; posterior pair appressed, black, sometimes brownish apically. Eyes black. Antennae long, very slender, pale testaceous with first (save narrow apex) and apical three-fourths of fourth segments black, measurements—I, 18; II, 12; III, 82. IV, 55. Bucculae broad, areolate, closed in front, black, sometimes with inferior and hind margins brownish. Rostrum brown, reaching to middle of metasternum; laminae high, uniseriate, black, often with inferior margin brownish. Orifice not visible.

Pronotum strongly convex, very coarsely punctate, areolate on hind projection, tricarinate; median carinae moderately elevated, uniseriate; lateral carinae concealed by large paranota, save on triangular projection, there short and parallel; under paranotum (right removed)—strongly archly elevated, divergent anteriorly, terminating some distance behind calli, composed of one row of very high areolae; hood brown, moderately high, not very wide; paranota enormously developed, very high, finger-like shaped, reflexed, with rounded base resting on pronotum, with outer edge not quite extending to median carina; projecting obliquely laterally upward (two divergent laterally), with crest rounded behind, with anterior side constricted at the middle so that the top protrudes, about twice as high as basal length. Elytra black or fuscous-black with costal area (save transverse band and apical part) pale testaceous, slightly concavely widened to median band, deeply constricted behind band; costal area wide, mostly triseriate with clear areolae (four cells deep and fuscous-black in median band, also in darkened apical part); subcostal area much narrower, biseriate, discoidal area large, extending beyond middle of elytra, with outer boundary vein slightly concave within, narrowed at both ends, widest near middle, there seven areolae deep; sutural area with areolae deeply clouded with black-fuscous, save three or four cells on apical margin. Hypocostal laminae uniseriate. Body beneath black.

LENGTH, 5.50-6.20 mm.; width, 1.00-1.20 mm.

TYPE (male) and ALLOTYPE (female), Peradeniya, Ceylon, 1911, taken by J. C. F. Fryer, British Museum. Paratypes: 6 specimens taken with type and 6 specimens, Henaratgoda, Ceylon, Nov. 11, 1902, Dr. Uzel.

This species was very finely but wrongly illustrated by Distant (*loc. cit.*, p. 142, fig. 105) as *E. greeni* Kirby. *E. distanti* (= *greeni* Distant, *nec.* Kirby) is wider, longer (black) first antennal segment, larger and taller finger-like paranotal processes of pronotum and a much wider, triseriate costal area of elytra. The true *E. greeni* Kirby is very closely related to *E. hewetti* (Distant).

CYSTEOCHILA **WECHINAI** Drake, new name

*Cysteochila chianiana* Drake, Proc. Biol. Soc. Wash., 67:5-6. 1954.

As the specific name *chiniana* was used by the writer in 1942

for a species of *Cysteochila* from China, the name *wechinai* is here proposed for species cited above from Philippines.

LEPTOPHARSA **MILLERI** Drake, n. sp.

Small, slender, oblong, pale testaceous with a few fuscous or black-fuscous markings as described in structural characters. Head fuscous, shining, with five, long, slender, pale testaceous spines; median spine erect, longer than front pair; hind pair longest, appressed; eyes large, fuscous. Bucculae pale testaceous, closed in front. Rostrum testaceous, dark at apex, barely reaching metasternum; laminae pale testaceous, meeting behind, not constricted on mesosternum, more widely separated on metasternum, uniseriate, the areolae moderately large. Orifice with a pale testaceous channel. Antennae long, slender, indistinctly setose; segments I and II moderately swollen, black-fuscous, shining; III very long, pale testaceous; IV dark fuscous, shortly pilose, measurements—I, 15; II, 9; III, 86, IV, 33.

Pronotum pale stramineous, moderately convex, punctate, tricarinate; collar testaceous, raised anteriorly; paranota moderately wide, pale testaceous, uniseriate, the areolae moderately large and clear; calli deeply impressed, blackish; carinae moderately elevated, each composed of one row of moderately large areolae, the median becoming slightly lower posteriorly; lateral carinae distinctly divergent anteriorly; hind process pale, areolate. Elytra narrow, with tips partly overlapping and jointly rounded behind; pale testaceous, with areolae of discoidal, vein between discoidal and sutural areas and veinlets in subcostal bordering darkened part of discoidal and some veinlets in sutural area infuscate; costal area moderately wide, uniseriate; subcostal area narrower, biseriate; discoidal area extending a little beyond middle of elytra, three cells deep in widest part at middle. Wings whitish, nearly as long as elytra. Body beneath stramineous.

LENGTH, 2.80 mm., width, 0.95 mm.

TYPE (*female*). Salisbury, South Rhodesia, Africa, Feb. 4, 1953, on "Polony tree," in Brit. Mus. Paratypes: 14 specimens, males and females, same locality as type, Jan., 1954.

This species is quite typical of the genus *Leptopharsa* Stal, and is much smaller than other African species described in the genus.



**LEPTOPHARSA QUADRATA** Drake, n. sp.

Small, oblong, brownish fuscous with costal area, paranota, legs and antennae (last segment brown) pale testaceous; areolae in paranota and costal area very clear. Pronotum, subcostal, discoidal and sutural areas sparsely clothed with very short golden pubescence. Head black, with some grayish pubescence; median and anterior spines rather short, stout, blunt, testaceous, turned downward; hind spines greatly reduced, brownish. Bucculae short, broad, areolate, closed in front. Antennae shortly pilose, with last segment subclavate, measurements—I, 7; II, 6; III, 37; IV, 17. Rostrum short, with apex between fore coxae; laminae widely separated and slightly divergent posteriorly on mesosternum, more widely separated and cordate on metasternum, with ends meeting behind. Orifice with a pale, raised sulcus. Hypocostal laminae narrow, composed of one row of tiny areolae.

Pronotum slightly convex, punctate, strongly narrowed anteriorly, tricarinate; lateral carinae long, extending anteriorly on calli, slightly convex and divergent in front of disc, all carinae without areolae; collar broad, areolate, raised anteriorly, without hood; paranota rather narrow, wider in front, uniseriate opposite humeri, much wider and biseriate opposite calli and collar. Elytra slowly narrowed posteriorly from middle, with apices jointly rounded behind; costal area moderately wide, thin, composed of one row of largely quadrate or rectangular cells (mostly a little wider than long); subcostal area composed of four rows of very small cells, about as wide as costal; discoidal area narrow, extending beyond middle of elytra, acutely angular at both ends, widest at middle, there four cells deep; sutural area with a little larger areolae.

LENGTH, 2.12 mm.; width, 0.90 mm.

TYPE (female) Durban, Natal, May 20, 1951, Drake Collection.

The large, clear, quadrate cells of the costal area separate this species at once from all described species in the genus.

**GALEATUS SCROPHICUS** Saunders

*Galeatus scrophicus* Saunders, Ent. Monthl. Mag., 13:103. 1876.

*Galeatus semilucidus* Jakovlef, Revue mens. d'Ent., 1:121. 1884.

*Galeatus scrophicus* Horvath, Ann. Mus. Nat. Hist. Hung., 4:52. 1906.

*Cademilus retairius* Distant, Ann. Soc. Belg., 53:114. 1910.

*Cademilus retairius* Distant, Fauna Brit. India, Rhynch., 5:107-108. 1910.

A study of the types and other specimens of *Galeatus scrophicus* Saunders and *G. retairius* Distant show that these two names apply to the same species, and the latter is here placed in synonymy (new synonymy). *G. scrophicus* is recorded in the literature from south-eastern Europe and northern Africa. Distant described *retairius* from India and lists the food plant as Chrysanthemums. Many specimens, taken on sunflowers, have been examined from Egyptian Sudan (Khartoum), northern Transvaal (Njelele river) and South-west Africa (Okhandja). Several specimens, Senegal (Bombey, April 27, 1943, Risbec) were collected on "saldades."

#### GENUS BAKO Schouteden

*Bako* Schouteden, Rev. Zool. Afr., 11:10. 1923.

*Galeotingis* Drake, Bol. Mus. Nat., Rio de Janeiro, no. 81, p. 1-2. 1947.

Through the kindness of Dr. H. Schouteden, Belgium Congo Museum, Bruxelles. I have been able to study the type of the genus Bako (*B. lebruni* Schout.) and find that the genus *Galeotingis* Drake is inseparable from it (new synonymy). *G. malayana* Drake and *G. usumburana* Drake are here transferred to the genus Bako. A comparison of specimens of *B. lebruni* and *usumbrana* may make it necessary to place the latter in synonymy.

#### XENOTINGIS LUZONANA Drake, n. sp.

Slender, testaceous with veinlets of large paranota more brownish, the areolae hyaline. Head brown, largely concealed (apex visible) from above by hood, unarmed. Antennae with first two segments short, brown, others wanting. Rostrum concealed by cardboard point. Legs slender, long, testaceous. Bucculae testaceous, closed in front. Orifice distinct. Hypocostal laminae rather narrow, uniseriate. Body beneath black, the thorax brown.

Pronotum concealed from dorsal aspect by the extremely large, semiglobose, reflexed, upright paranota which meet within above median carina, moderately convex, tricarinate; carinae thin, moderately elevated, with areolae not plainly visible; hood rather high, compressed laterally, covering basal part of head; paranota very large, longer than high (105:65), extending from near the front margin of collar posteriorly to end of hind pronotal process, with large areolae. Elytra much longer than abdomen, rather narrow, with apices overlapping and jointly rounded behind; costal area wide,

biseriate, with very large areolae, with outer row of areolae almost completely reflexed, with outer edge resting on elytral surface on boundary between discoidal and subcostal areas, the two surfaces almost in contact and at most only slightly separated; discoidal area about reaching to middle of elytra, narrowed at both ends, two cells deep at middle; sutural area with fairly large areolae. Wings not visible.

LENGTH, 3.25 mm.; width, 1.00 mm.

TYPE (female), Mt. Makiling, Luzon, Philippines, C. F. Baker, Drake Collection.

This species is very much smaller than *X. horni* and other described species. It is about the same size and very similar in general appearance as the new species described below.

**XENOTINGIS PAPUANA** Drake, n. sp.

Small, slender, brownish testaceous with veinlets and areolate structures of pronotum dark fuscous. Body beneath dark fuscous with the thorax more brownish. Head fuscous; median and hind spines short, brown, appressed. Rostrum long, with tip near end of sulcus, dark brown: laminae testaceous, uniseriate. Orifice with large channel. Bucculae contiguous in front. Legs long, slender, testaceous. Hypocostal laminae narrow, uniseriate.

Pronotum concealed dorsally by very large, reflexed paranota (only anterior part of hood visible); hood very large, inflated, unusually long, covering basal part of head and then extending posteriorly to base of posterior process of pronotum, a little compressed laterally, twice as long as high; median carina short, sharply raised anteriorly; lateral carinae extremely high, almost as high and half as long as hood, clouded with dark fuscous, semicircular in outline, nearly twice as high as long (65:38), with upper margin quite evenly rounded, composed of one row of very high cells; paranota extending from near front margin of collar posterior to middle of hind pronotal process, much longer than high (102:64), with the basal row of cells rather small and then the second row on the sides extremely high. Elytra much longer than abdomen, rather narrow, with moderately large, clear areolae; costal area wide, triseriate, with outer row of cells large, quadrate and completely reflexed so

that the outer edge rests on the boundary between subcostal and discoidal areas, the two inner or non-reflexed rows smaller and together not wider than outer; subcostal area very narrow; sutural area large, with areolae moderately large and not very regularly arranged; discoidal area large, reaching a little beyond middle of elytra, acutely angulate at both ends, widest at middle, there five cells deep. Wings atrophied.

LENGTH, 3.35 mm.; width, 1.0 mm.

TYPE (male), Kokoda, Papua, elevation 1,200 feet, June, 1933, Miss L. E. Cheesman, British Museum.

The size and general appearance allies this species with *X. luzonana* n. sp. but it can be readily distinguished by the extremely long hood, extremely high and semicircular lateral carinae, infusate areolate structures of the pronotum, larger discoidal area and triseriate costal area. These same characters as well as the much smaller size distinguish *papuana* from the larger species of the genus.

## TWO NEW SPECIES OF CINARA (Aphidae).

F. C. HOTTES  
Grand Junction, Colorado

G. F. KNOWLTON  
Utah State Agricultural College  
Logan, Utah

**CINARA MINUTA** Hottes and Knowlton, n. sp.

APTEROUS OVIPAROUS FEMALE.

Length from vertex to end of anal plate varying from 2.28-2.36 mm. Color notes from life not available. Color in life perhaps rather pale. Femora pale with apical portions darker. Tibiae with knees dusky, apical region the same, region in between pale. Antennae pale dusky with segments five and six almost uniform in color. Mesosternal tubercle absent. Ocular tubercles very small. Antennal segments with the following lengths: III .35-.37mm., IV .15, V .19, VI .12 + .04mm. Secondary sensoria distributed as follows: III 0-1, IV 0, V 1. Antennal hair sparse, rather upstanding, set at an angle of about sixty degrees, or more. Antennal hair less than two times width of segment in length. Rostrum long, reaching to ventral plate. Hind tibiae 1.35mm. in length. Sensoria on hind tibiae very faint, difficult to see, perhaps rather atipic, distributed through-out length of tibiae. Tibial hair fairly numerous, upstanding, more numerous on inner margin than on outer. All tibial hairs shorter than width of segment. Cornicles .21mm. across base, with numerous long fine hairs, similar to those on dorsum of abdomen, and about .07mm. in length. Transverse pigmented spot apparently absent. Cauda very small and narrow.

DATA: Alpine Fir, *Abies lasiocarpa*. Richards Canyon, Utah. Sept 4, 1938. Nye, collector. Holotype oviparous female, deposited in the United States National Museum. This species differs greatly from other species taken on Fir. Its small size, dark cornicles, and short hairs, separate this species at once from most species taken on this host, its larger cornicles and the presence of hairs on the cornicles separate it from *C. pacifica* (Wilson) which has the hairs somewhat similar.

**CINARA ENIGMA** Hottes and Knowlton, n. sp.

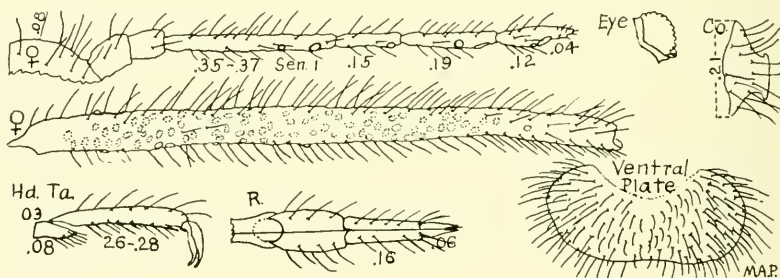
APTEROUS VIVIPAROUS FEMALE.

Length from the vertex to end of anal plate varying from 2.78-3.43mm. Described from cleared specimens. Color notes from life

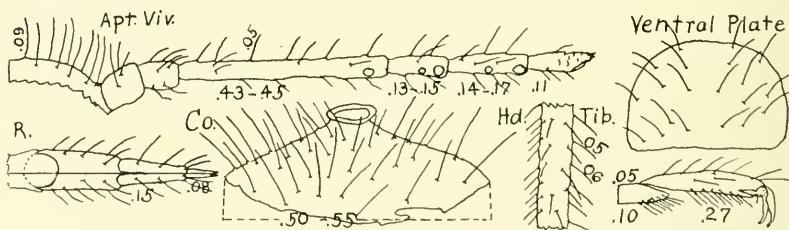


not available. Head and thorax dark dusky brown. Dorsum of meso and metathorax with pigmented areas, arranged more or less in two rows. Antennal segments one and two concolorous with head, third segment light dusky with apical portion of segment darker, segments four, five and six almost uniform dusky. Femora dusky with apical regions darker. Tibiae with knees dark, followed by a pale area, which is in turn followed by a dark area which extends for about half the length of the tibiae. Tarsi dusky. Spiracles with large pigmented areas. Cornicles with base very irregular, sometimes with one or more clear areas, dark brown in color. Cauda and anal plate dusky. Anterior to the transverse pigmented area there are several small pigmented areas.

Head with transverse suture rather pale, provided with a moderate number of hairs. Antennal segments with the following lengths: III .43-.45mm., IV .13-.15mm., V .14-.17mm., VI .11 + .02mm. The unguis is sometimes shorter than the length indicated. Primary



*Cinara minuta* n.sp.



*Cinara enigma* n.sp.

sensoria present on segments three, four, five and six. Secondary sensoria distributed as follows: III 0-1, IV 0-1, as a rule one, V 1. Marginal sensoria on VI small almost all rim, rather far removed

from primary, in some cases difficult to see. Hair on antennae sparse, rather upstanding, in length less than twice width of segment, some hairs on segments four and five longer than others. Unguis unique, very short, blunt, hardly a nubbin and little differentiated from rest of segment. Ocular tubercles present but small. Rostrum extending to metathoracic coxae. Last three segments of the rostrum with the following lengths: .21, .15, .08mm. Mesosternal tubercle absent. Hind tibiae 1.57mm. in length. Hind tarsal segments .10 and .27mm. in length. Hair on hind tibiae sparse, upstanding, less than width of segment in length, hair on outer margin coarser and more upstanding than the hair on the inner margin. First segment of hind tarsis with about eight hairs. Cornicles with base varying from .50-.55mm. outer margin of cornicles very irregular, this area has fewer hair than the raised portion. Hairs on dorsum of abdomen about .1mm. in length, quite numerous. Transverse pigmented area anterior to cauda divided or almost so, with one row and a partial second row of long fine hairs, these hairs are the longest on the body. Dorsum of abdomen very finely reticulated but the reticulations are difficult to make out. Cauda and anal plate with long fine hairs, surface between hairs coarsely setulose.

Our information relative to this species is very meager and unsatisfactory and were it not for the peculiar structure of the unguis, which, very easily differentiates this species from allied forms, it might better not be described. The host is indicated first as cucumber, this has been crossed out and conifer? substituted, which is better, we suspect some species of *Pinus*. The locality is indicated as Pass, Colorado, but there is no such place. Perhaps it was taken a conifer growing along one of the numerous Passes in Colorado, but which one we do not know. We are sure that it was taken on June 20, 1943 by Barrows. Holotype apterous viviparous female, deposited in the United States National Museum. In Palmer's key to the genus *Cinara* in "Aphids of the Rocky Mountain Region," this species can not be keyed beyond couplet 23, because of the shortness of rostral segment four. As indicated the unguis of this species is unique.





## NOTES ON SOME NEVADA BIRDS

NED K. JOHNSON

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Distributional knowledge of the avifauna from areas comparatively little known ornithologically, such as are present in many parts of Nevada, benefits both from accumulation of data concerning common, familiar species as well as from supplementary records of uncommon and rare forms. Linsdale's studies (Pac. Coast Avif. No. 23, 1936 and *Condor*, 53, 1951:228-249) establish a basis for evaluation of records over the state. "The Birds of Lahontan Valley, Nevada" (*Condor*, 48, 1946:129-138) by Alcorn provides perhaps the best available summary of intensive field work in one definite area of northern Nevada. Many other papers concerning distributional and seasonal records of Nevada birds have appeared recently in the *Condor*. However, much more field work must be done before the status of the majority of Nevada birds, with reference to abundance and range, can be accurately postulated.

The following notes would seem of value since they pertain to birds uncommonly recorded from Nevada, and to regularly present species where additional comments are pertinent to better clarify their status. Specimens mentioned are preserved in the University of Nevada Museum of Biology collections.

*Melanitta deglandi*. White-winged Scoter. Three specimens taken in Churchill County by Alcorn in November, 1940 and 1941 appear to be the only records of this duck in Nevada. The following notes are also from Churchill County. On October 22, 1949, W. V. Woodbury examined a juvenile, presumably dead from botulism, at the Nutgrass Area in the Stillwater Wildlife Management Area, eighteen miles east-northeast of Fallon. One was shot by a hunter there on November 4, 1951. Another individual was shot by a hunter (Mr. Ted Sherman) near Hazen on October 28, 1951. The heads, wings, and feet of these two birds, both in juvenile plumage, were preserved for identification.

*Falco columbarius*. Pigeon Hawk. A specimen was taken on March 16, 1952, at Reno. An English Sparrow (*Passer domesticus*)

was clutched in the talons of the hawk when collected. The crop contained another English Sparrow, while the stomach was gorged with two small, unidentified Passerines.

*Charadrius hiaticula semipalmatus*. Semipalmated Plover. I have a fall record in addition to Marshall's (*Condor*, 53, 1951:157). Two birds in juvenile plumage were collected from a group of five seen at Little Washoe Lake, Washoe County, September 3, 1950.

*Numenius americanus*. Long-billed Curlew. Recorded each spring and summer in the southwestern Truckee Meadows in which Reno is situated. Extreme dates are April 1 and August 31, with July records absent. No more than eight individuals have been noted in one day. Individuals observed May 19, 1951, showed nesting activity, but no eggs or young were seen. This is the first report of the species from Washoe County.

*Totanus melanoleucus*. Greater Yellow-legs. To my knowledge no records of this wader are available from Washoe County. In the vicinity of the Nevada Game Farm, Truckee Meadows, small numbers are present each spring. Records are from April 8 to the middle of May. On September 3, 1950, one was noted at Little Washoe Lake. A specimen was taken there September 14, 1951.

*Totanus flavipes*. Lesser Yellow-legs. A scarce migrant in Nevada represented by two specimens from Elko County, three specimens from Churchill County and a sight record from Clark County. On April 19, 1952, the writer collected two specimens from a group of three birds at the northwest edge of Carson Lake, 12 miles south-southeast of Fallon, Churchill County.

*Erolia alpina pacifica*. Red-backed Sandpiper. Linsdale lists four records from the state. V. K. Johnson and I recognized a single bird in the Truckee Meadows four miles southeast of Reno on May 8, 1948.

*Limnrodromus scolopaceus*. Long-billed Dowitcher. From near the Nevada Game Farm, Truckee Meadows, I have the following sight records: two birds on March 27, 1949; twelve on May 15, 1949, and twenty-one on April 16, 1951. A flock of fifteen was present at Little Washoe Lake on April 18, 1948, and three were seen there on September 3, 1950. On the following day a specimen

was taken. These are the first records from Washoe County.

*Ereunetes mauri*. Western Sandpiper. Eight individuals were observed at close range on March 26, 1951, at a playa lake 4 miles east of Chiatovich Ranch (Arlemont) in Fish Lake Valley, Esmeralda County. This is a new record for this shorebird in Esmeralda County as well as an early date for the presence of the species for the spring migration in Nevada.

*Tyto alba*. Barn Owl. Two secondary wing feathers and several pellets of an owl were found in a narrow cave near the bottom of Devil's Hole National Monument, (about ten miles northeast of Death Valley Junction, California). Ash Meadows, Nye County, on April 10, 1950. The feathers are unquestionably those of the Barn Owl, indicating the first known occurrence of this bird in Nye County. On June 25, 1951, another visit was made to the locality. A single Barn Owl flew from the crevice as I approached, and although no nest was located in the area, a sack of pellets was gathered from the ground at the bottom of the hole.

*Dendrocopos albolarvatus*. White-headed Woodpecker. This woodpecker is an uncommon resident in the Sierra Nevada along the western border of the state. No reports are apparently available from Nevada since 1889, when Keeler took a specimen at Glenbrook, Lake Tahoe, Douglas County, May 28. Therefore it seems profitable to put on record the following recent observations. An individual was observed at Incline, Lake Tahoe, Washoe County on May 8, 1949. After a snowstorm in the Sierras a single bird, apparently a female, was present in the Truckee Meadows area at Reno, 4500 feet, on October 24, 1950. What was probably the same individual appeared in Reno on November 24, 1950, and again on January 11, 1951.

*Thryomanes bewickii*. Bewick Wren. The race *atrestus* of western Nevada has been discussed by Miller (*Condor*, 43:250-251). Linsdale (1951:240) lists *atrestus* only from Lyon and Churchill Counties, although Miller reports a specimen from the Truckee Canyon, thirty miles east of Reno. This specimen represents Washoe County. Alcorn (1946:135) records the species as "not abundant" in Lahontan Valley. In the Truckee River canyon from Wadsworth to Verdi, along Hunter Creek to 6000 feet in the Carson Range six miles southwest of Reno, and in the Reno area, all in Washoe County,

I have found this species one of the commonest residents. It seems very much restricted to the tangles of Wild Rose(*Rosa*), and Willow (*Salix*) near water, and among the exposed roots of trees along banks where debris has accumulated from high water. My notes of this wren are most abundant through the period from December to June. One was taken along the Truckee River sixteen miles east of Reno on February 4, 1951.

*Bombycilla garrulus*. Greater Waxwing. I have an additional record of this rare winter visitant, two birds seen on the University of Nevada campus in Reno, Washoe County on January 27, 1952. The pair flew from their perches in a willow tree to forage on a boggy layer of matted cattails (*Typha*) at the edge of a pond.

*Bombycilla cedrorum*. Cedar Waxwing. The seasonal status of this species in Nevada will probably never be more definite than "irregular visitant." Linsdale has several May, June, and September records representing widely scattered localities over the state, except the western region. Alcorn's Churchill County notes report this species as "seen most frequently in September, October, November, and December. Less often recorded in January, May, and June." In the Truckee Meadows area, Washoe County, I have observed flocks of Cedar Waxwings, in numbers of from a few to about forty individuals, on twenty-four separate days representing eight different months in the last five years. I have recorded this waxwing consistently through the years only in the month of October. However, I have observed it most common in March and April, contrary to Alcorn's observations. Also, I have two observations for February, but lack records for November and December. It may be said that this species is to be expected in Nevada at any time except the period between early June and the middle of September.

*Amphispiza bilineata*. Black-throated Sparrow. A female in breeding condition was taken at Ash Meadows, Nye County, on April 5, 1950. Two days later an individual was seen near Warm Springs, four miles northwest of Glendale, Clark County. These records are early spring dates for this sparrow in Nevada, as Linsdale gives April 20 as the earliest date. However, on March 20, 1939, several were seen on the Nevada shore of the Colorado River at Willow Beach (Grater, MS.). These birds were perhaps migrants.

SOME TERRESTRIAL GASTROPODS FROM THE  
DEEP CREEK MOUNTAINS, JUAB COUNTY, UTAH

ERNEST J. ROSCOE

Ecological Research, University of Utah

This paper records ten kinds of terrestrial gastropods from three localities in the Deep Creek Mountain area of western Juab County, Utah, a region from which no mollusks have been recorded previously. *Hawaiiia minuscula* (Binney) is reported from the County for the first time. These collections extend the range of two of the snails: *Oreohelix eurekaensis* Henderson and Daniels being known hitherto only from the type locality near Eureka in the eastern part of the country, and *O. subrudis* (Pfeiffer) known only as far west in Utah as the Oquirrh Mountains. Specimens are deposited in the University of Utah collection and in the Ecological Research reference collection.

COLLECTION STATIONS

1. West slope of Deep Creek Mountains, below Haystack Peak near the eastern boundary of the Goshute Indian Reservation. In swampy area in meadow near the upper limit of the Aspens, el. ca. 7500 feet, July 28, 1953, R. L. Gering, collector.

*Discus cronkhitei* (Newcomb)

*Euconulus fulvus alaskensis* (Pilsbry)

2. Four miles west of Callao, el. ca. 5200 feet, under crevices near mammal excavations. August 3, 1953, Dale Parker, collector.

*Oreohelix subrudis* (Pfeiffer)

3. East slope of Deep Creek Mountains, at base of cliff, south side of canyon bottom, summit of old Callao-Ibapah Pass. In Aspen, Douglas Fir forest, el. ca. 7500 feet, September 26, 1953, R. L. Gering, collector.

*Hawaiiia minuscula* (Binney)

*Microphysula ingersolli* (Bland)

*Oreohelix eurekaensis* Henderson & Daniels

*Oreohelix subrudis* (Pfeiffer)

*Pupilla blandi* Morse

*Vallonia albula* Sterki

*Vitrina alaskana* Dall

*Zonitoides arboreus* (Say)





# THE DESCRIPTION OF THE ALATE FORM OF *LACHNUS MONTANUS* (Wilson)

F. C. HOTTES  
Grand Junction, Colorado

The destruction and havoc which a late spring freeze can have on leaf feeding Aphids was well illustrated this spring when a series of killing frosts in late May and early June killed the leaves of scrub oak and caused them to dry. When these frosts took place various species of *Myzocallis* and *Thelaxes californica* (D) were already well along in their life processes. When the frost killed the leaves, the specimens not being adapted to live on the bark also died, and the species have yet to reestablish themselves in the region where the killing frosts took place. The bark feeders appear to have been less effected. But they too, may have come under the influence of the killing frosts. For several years the author has been attempting to collect alate forms of *Lachnus montanus* (Wilson) without success. Although I lack positive proof, I suspect that the series of frosts which killed the leaves of scrub oak in late May and early June, so altered the conditions under which this species lives that a few alate specimens were produced. These specimens were taken on a dry ridge where scrub oak alone grows, the trees on which the specimens were taken were still without leaves June 29th, such was not the case in other areas where alate forms were not taken.

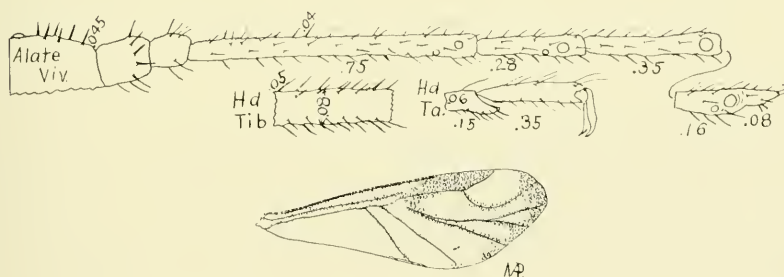


Fig. 1. *LACHNUS MONTANUS* (Wilson)

## *LACHNUS MONTANUS* (Wilson)

ALATE VIVIPAROUS FEMALE. Length from vertex to end of anal plate varying from 3.08-3.57 mm. Width of head across eyes .81 mm.

Length of antennal segments as follows: III .65-.71 mm., IV .25-.28 mm., V .37 mm., VI .08-.11 + .157 mm. Length of hind tibiae 2.86-3.14 mm., length of hind tarsis .143 + .25 mm. Width of head across eyes .81 mm. Width across base of cornicles .30-.34 mm. Color as in darker forms of viviparous females. Wings with veins heavily bordered with fuscous, the fuscous extending almost solid into apex of wing. Rostrum extending to region just beyond meta-thoracic coxae. Secondary sensoria distributed as follows: III 1-2 near apex, on this segment the secondary sensoria are small, IV 1-3 as a rule one or two, V 0. Hair on antennae and legs as in apterous viviparous forms. Base of cornicles very irregular in outline. Base of cornicles and dorsum of abdomen with few hair, the hair on the cornicles being much longer than the hair on the dorsum. Dorsum of abdomen with a few small irregular shaped pigmented spots. Second branch of media closer to margin of wing than to first branch.

Morphotype alate viviparous female, deposited in the United States National Museum. Collected June 29, 1954, at Mud Springs, south of Glade Park, Colorado. Host *Quercus gunnisoni*.



## SMALL CLAM ATTACKS YOUNG TROUT<sup>(1)</sup>

VASCO M. TANNER

Professor of Zoology and Entomology  
Brigham Young University

Since we have found so little recorded information about the feeding habits of the molluscan genus *Pisidium*, it is believed that the following observations may be of interest to some biologists.

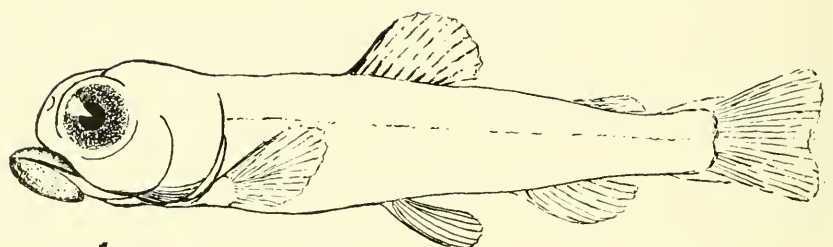
In February of this year (1954) at the White Rocks, Uinta County State Fish Hatchery more than 100 rainbow trout fry were found to have an enlargement on their lower lip which precluded their feeding. A dozen of these afflicted young trout were brought to my Ichthyology class by Richard Kay, son of Lee Kay, Editor of the Fish and Game Bulletin of the Utah Fish and Game Department. It was at once evident that the young fish, which averaged 32 mm. in length, were being attacked by one of the *Sphaeriidae*. An examination of the specimens revealed that adults of *Pisidium variable* Prime had attached themselves to the lower jaw of the young fishes. The illustrations, Figures 1 to 4, show how these clams were attached to the jaw of the fish and the extent to which they had eaten the tissues. Adult clams of this species are usually found in the thin mud of small ponds and streams. Evidently there was sufficient mud in the rearing troughs in which the clams could bury themselves. As the young fish came in contact with the bottom mud in feeding, the *Pisidia* fastened on to the lower lip when the mouth was open. Once attached, it was impossible for the fish to feed. The lower lip was gradually digested as shown in figures 3 and 4.

A brief report of this finding, along with a photograph of a specimen, was made by M. J. Madsen, Biologist in charge of Utah Fisheries, in the March, 1954, number of the Utah Fish and Game Bulletin. Since the photograph does not show the nature of the damage done to the tissues of the dentary and tongue by the clams, the drawings were made which clearly show the lethal attachment and effects.

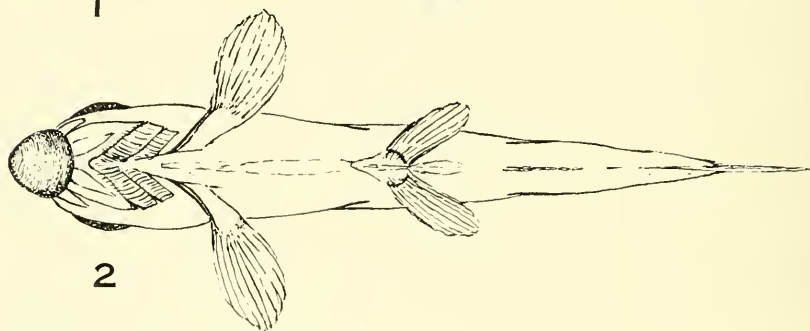
Mr. Ernest J. Roscoe, a student of Utah Mollusca, examined a specimen of this clam and reported that it definitely keys to *Pisidium variable* Prime, but that Rev. Herrington is making a study of

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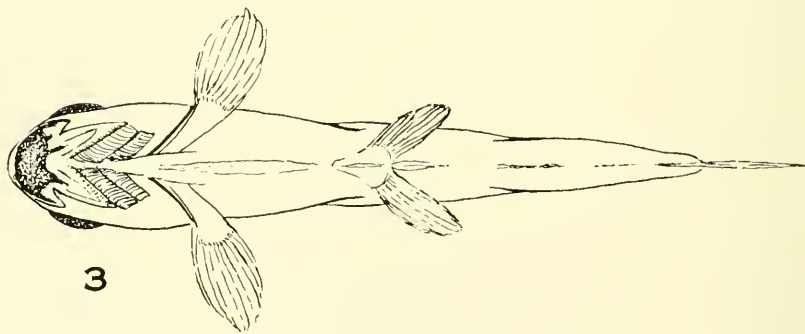
(1) Contribution No. 140.



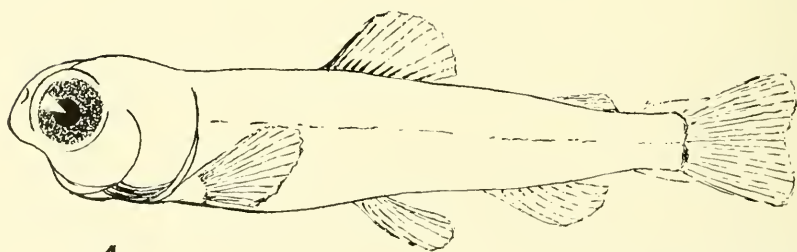
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Figures 1 to 4 show drawings of young rainbow trout attacked by the *Pisidium variable* Prime. Figures 3 and 4 show the extent to which the clams have digested the dentary and tongue of the young fishes. Scale 4x.

this genus and its species, which may result in a change of the name.

This brief report serves to bring to our attention what seems to be a new observation of the relationships between organisms as they struggle for an existence.



# GASTROIDEA CYANEA MELSH (*Coleoptera*) PREYED UPON BY AN HEMIPTERAN PREDATOR

VASCO M. TANNER

Department of Zoology and Entomology

GERALD L. NIELSEN

Student of Entomology

Brigham Young University

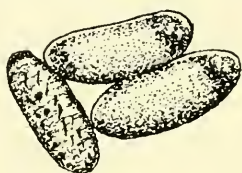
This spring, 1954, the season is two to three weeks in advance of the average growing season in this area. As a result the plants and insects are well developed and abundant. By the first of May the Sour Dock *Rumex patens* L. was a foot in height and by May 8th the leaves were being attacked by the first instar larvae of the leaf beetle *Gastroidea cyanea* Melsh. On May 10th the junior author brought into the laboratory stems and leaves of the dock on which were some of the overwintering adult beetles, spring eggs, and larvae. The yellow eggs, Figure 1, which were laid on May 10th hatched on May 13th. The young larvae commence feeding as soon as they are out of the eggs. Figure 2 is a second instar larva. No accurate information on the number of instar was obtained. Pupation was noticed on May 20th and adults were hatching by May 26-28th. By this date the docks were badly destroyed, most of the leaves had been devoured except for the veins and stems. Figure 3 is a newly emerged adult.

On the 10th of May while observing in the field the life stages of this beetle, several specimens of *Euschistus variolarius* (P. B.) were found feeding upon the larvae and oversized female adults. This is the first time we have noted this species preying upon another insect. We have not been able to find much recorded on the predaceous habits of this pentatomid. It feeds in the main upon plants such as wheat, red clover, tomatoes, grasses, peaches, peas, mullein and several other local plants. C. E. Olsen (1912) reports that this "species is said to feed on Lepidopterous larvae, and that G. W. Kirkaldy records its preying on *Pulvinaria virginicum* L. (Hem.)." Our observations definitely establish another insect host record for *E. variolarius*.

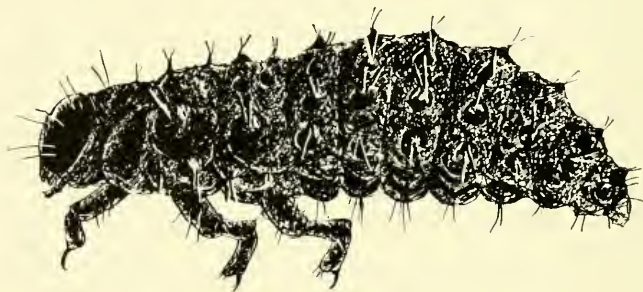
A review of the specimens of *G. cyanea* in the entomological collections show that it is widely distributed throughout the state.

(1) Contribution 141 from the Department of Zoology and Entomology.

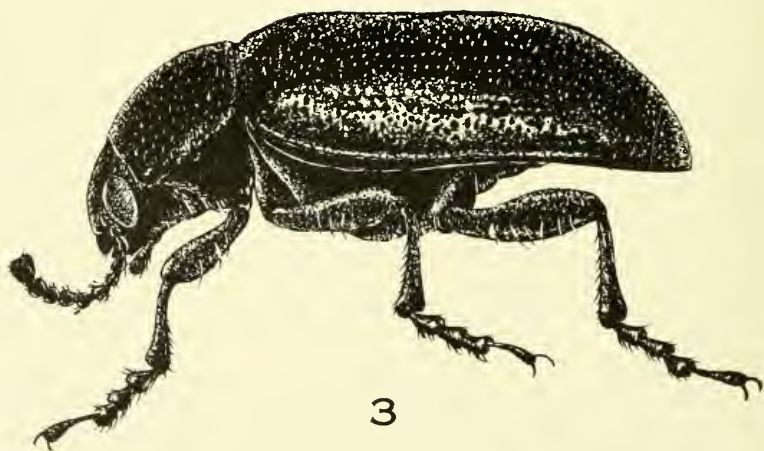
A comparison of Utah specimens with a series from Pennsylvania and several from Berkeley, California, has supported the identifica-



1



2



3

Figures 1-3 eggs, larva and adult of *Gastroidea cyanea* Melsh.  
Eggs 20X; larva 10X; adult 20X.

tion of the Utah and Arizona specimens as *G. cyanea* Melsh. Rogers, 1856, considered the Central California specimens as a subspecies *caesia* of *cyanea*. The Utah specimens are morphologically similar to the Arizona and Pennsylvania ones which stand in our collection as *cyanea*.

Distribution of *G. cyanea* Melsh in Utah:

Grand Co.:—Moab, June, 1927 (A. Call)

Garfield Co.:—Aquarius Plateau, 1937 (W. W. Tanner)

Kane Co.:—Orderville, June, 1927 (V. M. Tanner)

Sanpete Co.:—Indianola, September, 1918 (V. M. Tanner)

Utah Co.:—Spanish Fork (V. M. Tanner); East side of Utah Lake, 1927 (V. M. Tanner); Provo, May, 1954 (G. Nielson and V. M. Tanner).

Washington Co.:—Central, June 15, 1922 (V. M. Tanner)  
St. George, March 15, 1921; Zion National, 1925 (V. M. Tanner).

Arizona:—Kiabab Forest, July, 1927 (J. Kartchner).

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# A STUDY OF SOME ROCKY MOUNTAIN SPOTTED FEVER VECTORS AND THEIR HOSTS IN UTAH<sup>(1)(2)</sup>

MARVIN D. COFFEY  
Pullman, Washington

In Utah, spotted fever has been known in an endemic state since 1908. Although this is true, few workers have been drawn to study the vectors responsible for the transmission of this disease. From 1934 to 1952 there has been an average of 12.3 cases of spotted fever per year in Utah and a 17.5 case fatality average. Published distributional records of ticks which have been implicated as vectors of Rocky Mountain spotted fever in Utah are listed by Cooley (1938 and 1946), Cooley and Kohls (1944), Davis (1941 and 1943), Jellison (1945), Bishop and Trembley (1945), Hunter and Bishop (1911), Kohls and Parker (1948), Stanford (1934), Woodbury and Hardy (1948), and Edmunds (1951). The latter's work is the most recent distributional study. It included, however, a taxonomic and distributional study of all the ticks of Utah.

This study was made with special reference to the tick vectors of spotted fever in Utah, their hosts, and their distribution. Data from the literature is included, with the new records herein reported in order to give a more complete picture.

To the men and institutions who aided this study the author would like to express his sincere appreciation. The study was in part supported by a research grant from the Microbiological Institute of the National Institutes of Health, United States Department of Health, Education, and Welfare. Dr. Vasco M. Tanner, Brigham Young University, made available certain facilities in the department of Zoology and Entomology for the study; Mr. John Wright of the Utah State Department of Health furnished data concerning the incidence and distribution of spotted fever in Utah and Mr. Glen M. Kohls, Rocky Mountain Laboratory, Hamilton, Montana gave assistance in the corroboration and determination of some specimens. Thanks also are due to my co-workers in the collection of many of the specimens, Mr. Dorald M. Allred, The University of Utah, and

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(1) Contribution No. 139 from the Dept. of Zoology and Entomology, Brigham Young University.

(2) This study was in part supported by funds from the National Institutes of Health, United States Department of Health, Education, and Welfare.

Mr. Merlin L. Killpack, Roosevelt (Utah) Union High School, as well as numerous fellow students who gave assistance. I am especially indebted to Dr. D Elden Beck of the Brigham Young University. It was under his supervision that this research project was directed.

In Utah six species of ticks are found which have been shown to be capable<sup>3</sup> or potential<sup>4</sup> vectors of spotted fever. *Dermacentor andersoni* Stiles is the only tick found in Utah which readily bites man. This tick and *Haemaphysalis leporis-palustris* (Packard), a proven vector in nature, are herein classified as capable. Potential vectors include *Dermacentor parumapertus* Banks, *Dermacentor albipictus* (Packard), *Rhipicephalis sanguineus* (Latreille), and *Ornithodoros parkeri* Cooley. The latter three have never been considered very important in spotted fever transmission, but because of experimental evidence they are included here. *D. parumapertus* similarly has not received much attention, but due to its abundance and its overlapping the range of *D. andersoni* (with some common hosts) in some parts of Utah, it must be considered as an important potential vector.

This study represents over eight hundred collection records (lots) for the State of Utah. It has involved several thousand specimens<sup>5</sup> taken from forty-nine species of mammals and one species of bird.

The majority of collections represent new geographical distribution areas for both vector and host. Each tick collection has been treated separately, listed from the specific host on which it was found and identified with the county collected in.

The designation, "*Dermacentor sp.*," refers only to nymphs and larvae of that genus. Due to the extreme difficulty in taxonomic separation with regard to some of the immature stages of ticks in the genus *Dermacentor*, specific designation has not been possible.

In the lists shown below, all references to records from the literature are indicated by the author's names and date of publication appearing in parenthesis under county reference. All other records may be considered as new.

(3) By capable is meant those ticks which in nature have been shown to possess the rickettsia and/or are known to transmit the disease.

(4) By potential is meant those ticks which have only been shown experimentally in the laboratory to become infected with or transmit the rickettsia.

(5) These specimens are a part of the parasitic arthropod collection in the Brigham Young University Zoology and Entomology Museum collections.

# HOST LIST AND DISTRIBUTION OF ROCKY MOUNTAIN SPOTTED FEVER VECTORS IN UTAH

## 1. DERMACENTOR ANDERSONI Stiles

### HOST

### GEOGRAPHIC DISTRI- BUTION BY COUNTY

<i>Erethizon dorsatum</i> :	Daggett, Duchesne, Rich, Sevier,
<i>Lepus americanus</i> :	Uintah, Utah, Wayne.
<i>L. californicus</i> :	Wasatch.
<i>L. townesendii</i> :	Juab, Kane, Utah.
<i>Lynx rufus</i> :	Daggett, Utah, Wasatch.
Man:	Uintah.
	Cache, Daggett, Duchesne, Gar- field, Grand, Millard, Rich, San Juan, Tooele, Uintah, Utah, Wasatch, Washington.
<i>Odocoileus hemionus</i> :	Sanpete, Utah.
Horse:	Duchesne.
<i>Peromyscus maniculatus</i> :	Utah.
Sheep:	Duchesne, Wasatch.

Edmunds (1948 and 1951) reports this tick as occurring in the following counties: "Box Elder, Cache, Davis, Duchesne, Emery, Garfield, Iron, Kane, Salt Lake, San Juan, Summit, Sanpete, Tooele, Utah, Uintah, Wasatch, Washington, and Wayne. Without indicating collection localities he lists the following hosts for *D. andersoni*: cattle, chipmunks (numerous species), horse, man, pocket gopher, porcupine, rabbits (numerous species)."

## 2. DERMACENTOR PARUMAPTERTUS Banks

<i>Dipodomys merriami</i> :	Washington.
<i>D. ordii</i> :	Juab.
<i>Lepus californicus</i> :	Beaver, Box Elder, Iron, Juab, Juab (Stanford 1934), Kane (Edmunds 1951), Millard, Sanpete, Sevier, Tooele, Tooele (Edmunds 1951), Utah, San Juan (Edmunds 1951).
<i>L. townsendii</i> :	Wasatch.
<i>Perognathus parvus</i> :	Juab.
<i>Peromyscus maniculatus</i> :	Utah.
<i>Sylvilagus nuttallii</i> :	Utah.
<i>Sylvilagus sp.</i> :	Kane (Edmunds 1951).

## 3. DERMACENTOR ALBIPICTUS (Packard)

<i>Antilocapra americana</i> :	Daggett (Edmunds 1951).
<i>Cervus canadensis</i> :	Cache.
Horse:	Garfield (Edmunds 1951).
<i>Odocoileus hemionus</i> :	Cache (Edmunds 1951), Millard, Sanpete.

## 4. DERMACENTOR SP.

<i>Citellus armatus</i> :	Cache, Rich, Summit, Utah Wasatch.
<i>C. lateralis</i> :	Daggett, Duchesne, Kane, Rich, Sanpete, Sevier.
<i>Citellus leucurus</i> :	Box Elder, Kane, Utah, Wayne.
<i>C. variegatus</i> :	Garfield, San Juan, Sanpete, Sevier, Utah, Wayne.
<i>Cynomys leucurus</i> :	Rich.
<i>Cynomys sp.</i> (burrow):	Daggett.
<i>Dipodomys deserti</i> :	Washington.
<i>D. merriami</i> :	Washington.
<i>D. microps</i> :	Box Elder, Juab, Sevier, Utah, Washington,
<i>D. ordii</i> :	Beaver, Box Elder, Daggett, Duchesne, Grand, Juab, Kane, Sevier, Uintah, Utah,
<i>Eutamias dorsalis</i> :	Duchesne, Garfield, Utah.
<i>E. minimus</i> :	Duchesne, Rich, San Juan, Sevier.
<i>E. quadrivittatus</i> :	Daggett, Duchesne, Utah.
<i>Lepus californicus</i> :	Beaver, Box Elder, Garfield, Iron, Juab, Kane, Millard, Uintah, Utah.
<i>L. americanus</i> :	Wasatch.
<i>L. townsendii</i> :	Uintah, Daggett.
<i>Marmota flaviventris</i> :	Cache, Duchesne, Garfield, Utah.
<i>Microdipodops megacephalus</i> :	Beaver.
<i>Microtis longicaudus</i> :	Cache, Daggett, Sanpete.
<i>Microtis sp.</i> :	Rich, Sevier, Wasatch.
<i>Mustela erminea</i> :	Daggett.
Man:	Daggett.
<i>Neotoma cinerea</i> :	Daggett, Tooele.
<i>N. lepida</i> :	Garfield, Kane, Piute, Sanpete.
<i>Oberholseria chlorura</i> (bird)	Box Elder, Tooele.

<i>Onychomys leucogaster</i> :	Box Elder.
<i>Ochotona princeps</i> :	Wayne.
<i>Perognathus parvus</i> :	Beaver, Box Elder, Juab, Rich, Sevier, Tooele, Utah.
<i>P. longimembris</i> :	Box Elder, Juab, Sevier, Washington.
<i>P. formosus</i> :	Garfield, Juab.
<i>Perognathus sp.</i> :	Box Elder.
<i>Peromyscus crinitis</i> :	Box Elder, Daggett.
<i>P. eremicus</i> :	Iron, Washington.
<i>P. maniculatus</i> :	Beaver, Box Elder, Cache, Daggett, Duchesne, Garfield, Juab, Kane, Morgan, Piute, Rich, Sanpete, Sevier, Summit, Tooele, Uintah, Utah, Wasatch, Wayne.
<i>P. truei</i> :	Beaver, Daggett, Duchesne, Piute, Uintah, Utah, Washington.
<i>Rattus norvegicus</i> :	Utah.
<i>Reithrodontomys megalotis</i> :	Tooele, Utah.
<i>Sciurus aberti</i> :	San Juan.
<i>Sylvilagus sp.</i> :	Wayne, Summit, Kane, Daggett.
<i>S. auduboni</i> :	Daggett, Duchesne, Washington.
<i>S. nuttallii</i> :	Box Elder, Sanpete, Utah.
<i>Thomomys bottae</i> :	Washington.
<i>Zapus princeps</i> :	Daggett, Utah, Wasatch.

#### 5. HAEMAPHYSALIS LEPORIS-PALUSTRIS (Packard)

<i>Citellus variegatus</i> :	Utah.
<i>Lepus californicus</i> :	Beaver, Box Elder, Garfield, Iron, Juab, Millard, Piute, Sevier, Tooele, Utah, Wasatch, Salt Lake (Edmunds 1951).
<i>L. townsendii</i> :	Daggett, Uintah.
<i>Neotoma cinerea</i> :	Duchesne.
<i>Oberholseria chlorura</i> (Bird):	Box Elder, Tooele.
<i>Sylvilagus sp.</i> :	Daggett, Emery, Emery (Edmunds 1951), Garfield, Grand, Grand (Edmunds 1951), Kane, San Juan, San Juan (Edmunds 1951), Summit, Uintah, Washington.
<i>S. auduboni</i> :	Daggett, Washington.
<i>S. idahoensis</i> :	Washington, Box Elder (Stanford 1934).
<i>S. nuttallii</i> :	Grand, Sanpete, Utah, Wasatch.

## 6. RHIPICEPHALIS SANGUINEUS (Latreille)

Dog: Salt Lake (Edmunds 1951), Salt Lake (Kohls and Parker 1948).

## 7. ORNITHODOROS PARKERI Cooley

*Citellus* sp.: Washington, (Davis 1941).  
*C. lateralis*: Wayne (Davis 1941).  
*Cynomys* sp.: Carbon, Emery, Grand, Iron, Uintah (Davis 1941), Daggett (in burrow).  
*Cynomys leucurus*: Uintah.  
*Gopherus agassizi*: Washington (Woodbury and Hardy 1948).

Rocky Mountain spotted fever. *Rickettsia rickettsii* (Wolffback), has been listed from every county in Utah except Piute. The vector, *D. andersoni*, has been reported from twenty-four of the twenty-nine counties in the state. Insufficient collections and the fact that the disease may not always be identified with the place where the tick was picked up, undoubtedly accounts for the four counties from which the disease has been listed but from which the vector has not been reported. It is of interest to note that in Utah, spotted fever is most prevalent in counties where population centers border hillsides or mountainous areas and least prevalent in the desert areas of the Great Basin and Colorado River Basin region in Utah. A study of the distribution of *D. andersoni* shows a direct correlation with these facts. Comparatively few records of the tick are known from the desert areas whereas the tick appears to be rather abundant in the valleys and hillsides along and throughout the mountainous areas of the state.

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## NEW COVER DESIGN

The new cover design maps the extent of the Great Basin in the states of California, Idaho, Nevada, Oregon, Utah, and Wyoming. This interior basin, as defined by Captain J. C. Fremont in 1845, comprises approximately 210,000 square miles. The main desert basin is made up of 150 north-south parallel mountain ranges, which contribute run-off from the winter snows to more than 100 intervening smaller basins.

The Utah trout, *Salmo utah* Suckley; the Great Basin rattlesnake, *Crotalus viridis lutosus* Klauber; and the tule billbug, *Calendra ochreus* Lec., are common Great Basin species. One hundred years ago the Utah trout was abundant in Utah Lake and other Bonneville Basin lakes and streams. The pioneer fishermen seined hundreds of tons of this trout from Utah Lake; some specimens weighing twelve to fifteen pounds each. Now this trout is virtually extinct in the warm water lakes where it was abundant.

The Great Basin rattlesnake ranges widely throughout the northern two-thirds of the basin. It is the only rattlesnake within its territory. Since it feeds mainly upon small mammals which reduce many of the forage plants of the desert, it may be considered as a useful species.

Among the interesting insects of this interior region, is the large strikingly marked billbug which breeds on the tule, *Scirpus acutus* Muhl. It is common around Utah and Nevada fresh-water lakes.

Those who have lived in the desert know of its allurements and of the many challenging biological problems.—V.M.T.









The

# Great Basin NATURALIST

VOLUME XIV

December, 1954

Nos. 3-4

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## The Great Basin Naturalist

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## THE TAXONOMY OF UTAH ORTHOPTERA<sup>1</sup>

ANDREW H. BARNUM<sup>2</sup>  
Grand Junction, Colorado

### INTRODUCTION

During the years of 1950 to 1952 a study of the taxonomy and distribution of the Utah Orthoptera was made at the Brigham Young University by the author under the direction of Dr. Vasco M. Tanner. This resulted in a listing of the species found in the State. Taxonomic keys were made and compiled covering these species. Distributional notes where available were made with the brief descriptions of the species.

The work was based on the material in the entomological collection of the Brigham Young University, with additional records obtained from the collection of the Utah State Agricultural College. In addition, those Orthoptera reported from the State in previous literature were included. Those species which have apparently been erroneously reported were commented upon, but not counted in the figures.

As a result of this study, 202 species (or subspecies) in 90 genera of Orthoptera have been reported from the State. In addition to this number, seven species in five genera are reported as hypothetical (marked<sup>H</sup> in listings in this paper). These species have been collected in Arizona near the Utah border and should be eventually found in Utah owing to the absence of ecological barriers. Of the 4200 Utah specimens in the Brigham Young University collection, 152 species are represented. Many of these specimens have been classified by the leading authorities on Orthoptera. An additional 23 species were examined at the Utah State Agricultural College.

1. In this study the roaches, praying mantids, walking-sticks, grasshoppers or locusts and crickets are all considered as being in the Order Orthoptera. The earwigs (Order Dermaptera) are not included, though some authors consider them as being part of the orthopteran group.
2. Abstracted from a Master's thesis submitted to the Department of Zoology and Entomology, Brigham Young University, June, 1952. Contribution No. 146 from the Department of Zoology and Entomology.

Thirty-four species were not available for examination. Thirty-eight species and seventeen genera were established as new records for the state and are marked with an asterisk (\*) in this paper. (These species had not been reported from the State when the Thesis was prepared, but later publications may have included some of them.) One species has been collected by the author since this research was completed, and is included in the present listings. Fifteen species have been erroneously reported as having been collected in the State by earlier workers and were not included in the totals. Nine unpublished records were found in the U.S.A.C. collection (marked<sup>AC</sup> in this paper).

The following table is a breakdown of the genera and species (or subspecies) reported from each family group:

	Total Genera	Reported Species	New Genera	Records Species	Hypothetical Genera	Species	Records in USAC Collection	Erroneous Reports
Blattidae	7	7	4	4				
Mantidae	2	3						
Phasmidae	3	4						
Tetrigidae	4	8						
Acrididae	54	140	5	23	4	4	7	10
Tettigoniidae	19	35	7	7	1	3	2	5
Gryllidae	6	12	1	4				
Total	95	209	17	38	5	7	9	15

### USE OF THE KEYS

The keys presented in this study are only partially descriptive and are merely for convenience. They are intended as a short cut in identification. Confusing morphological characteristics were represented by drawings in order to make the keys more readily adaptable for use.

These keys cover the species definitely known from Utah, and include several species found in adjoining states. As other species are found a revision of the keys will be necessary.

In cases involving any doubt of identification, a full description of the species in question should be checked, or comparisons made with accurately determined specimens. In the matter of descriptions the worker may run into difficulty. Anyone studying early descriptions realizes that most descriptions of species are completely inadequate if not entirely useless. They perhaps separated the known species at the time, but the constant addition of new species to the literature has limited the use of the original descriptions. It may therefore be necessary to check a complete description given by a recent author.

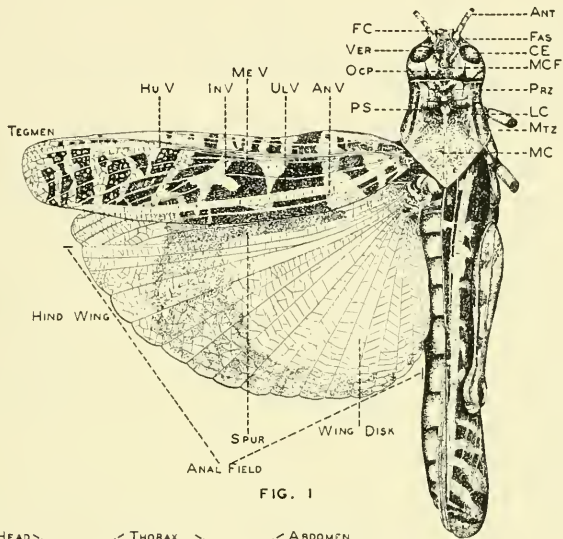


FIG. 1

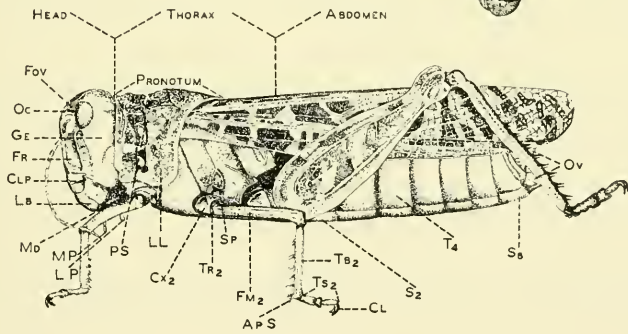


FIG. 2

The keys presented herein are incomplete in that they classify the insects only to Genus. For keys to species and subspecies the reader is referred to the original Thesis or to one of the many publications covering that particular group.

### KEYS TO THE FAMILIES OF ORTHOPTERA

1. Posterior legs enlarged and strongly modified for jumping; stridulating insects. .... (2)  
Posterior legs not enlarged for jumping, all legs equal in size; stridulating organs not developed ..... (5)
2. Antennae long and filiform; tarsi three- or four-segmented; ovipositor usually elongate, with its parts compact ..... (3)  
Antennae usually much shorter than body; tarsi three-segmented; ovipositor short, composed of four separate parts ..... (4)
3. Tarsi four-segmented; wings, when present, sloping at sides of body; ovipositor, when exerted, a long, compact blade. (Long-horned grasshoppers, katydids, etc.) .... Family *Tettigoniidae*  
Tarsi three-segmented or reduced; wings, when present, horizontal in greater part. (Crickets) ..... Family *Gryllidae*
4. Pronotum narrowed behind and prolonged backward to or beyond the tip of the abdomen; size very small. (Grouse or Pygmy Locusts) ..... Family *Tetrigidae*  
Pronotum never extending over the abdomen. (Locusts or Short-horned grasshoppers) ..... Family *Acrididae*
5. Anterior legs spined, highly specialized for grasping prey. (Praying mantids) ..... Family *Mantidae*  
Anterior legs not specialized for grasping ..... (6)
6. Body elongate and slender; legs slender, rounded; head free. (Walkingsticks) ..... Family *Phasmidae*  
Body flat, broad, oval; legs compressed; head withdrawn beneath pronotum. (Cockroaches) ..... Family *Blattidae*

### FAMILY BLATTIDAE (Cockroaches)

Insects with strongly depressed, more or less oval, bodies are readily referred to the family Blattidae. Other distinguishing characteristics separate them from other families of Orthoptera. The head is concealed beneath the pronotum, the face ventral, the mouth posterior. The antennae are long and filiform. The legs are slender, similar, and compressed. When fully developed, the tegmina are parchment-like and overlapping, and the wings membranous. Both tegmina and wings are often rudimentary or wanting in the female and sometimes in both sexes.

The sexes may be distinguished without difficulty, although there is no visible ovipositor. The males are characterized, in addition to the conspicuous cerci, by the presence of a pair of styles (Pl. II, Fig. 1), at the sides of the hind margin of the last ventral segment of the abdomen.

1. Middle or hind femora, or both, unarmed posteriorly, or armed with hairs or bristles only, or with one or two apical or subapical spines (Pl. II, Fig. 5) ..... (2)  
Middle and hind femora armed posteriorly with two or more distinct spines (Pl. II, Fig. 8) ..... (3)

2. Surface of pronotum and tegmina glabrous; claws separated by a distinct arolium (Pl. II, Fig. 9). Adventive ..... *Panchlora cubensis* Saussure\*  
Surface of pronotum and tegmina hairy; no arolium between the claws, or only a minute one ..... *Arenivaga erratica* Rehn
3. Pronotum and tegmina densely pubescent. Adventive. .... *Nyctobora noctivaga* Rehn\*  
Pronotum and tegmina smooth, or but sparsely haired or pilose .. (4)  
4. Pronotum 7 mm. or more in length ..... (5)  
Pronotum less than 7 mm. in length ..... (6)
5. Tegmina in both sexes extending considerably beyond the tip of the abdomen ..... *Periplaneta americana* (Linnaeus)\*  
Tegmina in both sexes not reaching the tip of the abdomen. .... *Blatta orientalis* Linnaeus
6. Tegmina of male extending beyond tip of abdomen; subgenital plate of female entire (Pl. II, Fig. 4) ..... (7)  
Tegmina of male shorter than abdomen; subgenital plate of female divided or split (Pl. II, Fig. 3) *Blatta orientalis* Linnaeus
7. Margin of fore femora armed posteriorly on basal half with from 3 to 6 strong spines succeeded distally by a row of smaller close-set spinules (Pl. II, Fig. 7); pronotum with two stripes of darker brown; styles of male indistinct or wanting ..... *Blattella germanica* (Linnaeus)  
Margin of fore femora armed posteriorly along its entire length with stout spines which diminish in length toward the apex (Pl. II, Fig. 6); pronotum without two dark brown stripes; styles of male distinct ..... *Supella supellectilium* (Serville)\*

#### FAMILY MANTIDAE (Mantids, Praying Insects, Soothsayers)

Members of the family Mantidae are strikingly peculiar in appearance. These insects have the femora and tibiae of the front legs enlarged and heavily spined for seizing insect prey. The middle and hind legs are slender. The body is elongate, with a free and transverse head. The wings in the female are often shorter than the abdomen. There is no visible ovipositor. Both sexes (Pl. II, Figs. 10 & 11) have a pair of short jointed cerci attached to the sides of the supra-anal plate, while the males have in addition a pair of much shorter styles near the apex of the subgenital plate. Sound producing organs are absent.

Only two genera have been found in Utah, being readily separated by size and morphological characteristics. In the genus *Litanotus*, of which there is only one species in the State (*L. minor* scudder), the pronotum is only slightly longer than the anterior coxae; the posterior femora is armed with an apical spine. Members of the genus are less than 32 mm. in length. The genus *Stagmomantis* contains two species. The adults are more than 50 mm. in length, the pronotum is much longer than the anterior coxae, and there is no apical spine on the posterior femora. Both *S. carolina* (Johannson) and *S. californicus* Rehn & Hebard have been found in the State.





FIG. 1



FIG. 2

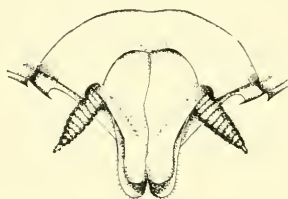


FIG. 3



FIG. 4

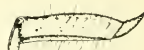


FIG. 5



FIG. 6

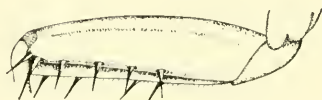


FIG. 8



FIG. 9



FIG. 7

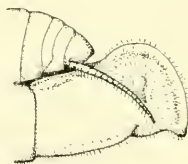


FIG. 10



FIG. 11



FIG. 12



FIG. 14

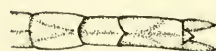


FIG. 13

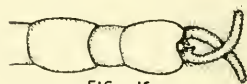


FIG. 15

## FAMILY PHASMIDAE (Walking-Sticks)

The walking-sticks are among the curiosities of the insect world. They are remarkable for their resemblance to twigs of plants or to dead grass, and are protected effectively by their habit of moving very slowly and of remaining motionless for long periods of time. They have an elongate, slender, and cylindrical body with an exerted head. The prothorax is very short, the mesothorax and metathorax elongate. The legs are slender and alike in form. Tegmina and wings are lacking in all the United States species. A large arolium is present between the claws at the end of the five-segmented tarsus. The ovipositor of the female is concealed by the subgenital plate and the cerci are not joined (Pl. II, Figs. 12-15).

1. Antennae distinctly longer than anterior femora ..... (2)  
    Antennae not more than one-half as long as anterior femora.  
        ..... Genus *Parabacillus*  
                     *P. hesperus* Hebard  
                     *P. coloradus* (Scudder)
2. Head carinate; middle femora of male slender, not thicker  
    than posterior ones; posterior femora unarmed in both  
    sexes ..... *Pseudosermyle stramineus* (Scudder)
- Head smooth; middle femora of male much swollen, distinct-  
    ly thicker than posterior ones; posterior femora armed be-  
    neath near apex with a single spine, in male very promi-  
    nent, in female often very small and sometimes wholly  
    absent ..... *Diapheromera femorata* (Say)

## FAMILY TETRIGIDAE (Pygmy or Grouse Locusts)

The pygmy or grouse locusts are among the smallest representatives of the Order Orthoptera and may be readily recognized by the prolonged pronotum which covers most of the body. This specialization provides protection for the delicate wings and replaces the tegmina, which have been reduced to small oval lobes or scales. The wings are usually present and well developed, but in some species are not infrequently reduced in size and rarely are obsolete or unfit for normal functions. The length of the pronotum also varies with the size of the wings. Both long and short winged individuals occur in the species. The prosternum projects forward as a chin piece covering the mouthparts. The pulvilli between the tarsal claws are absent. The subgenital plate of the male is conical or triangular; the cerci very small. The female may be recognized by the serrulate ovipositor with sharp diverging extremities.

1. Vertex extending forward beyond front of eyes, distinctly  
    wider than one of them when viewed from above, its front  
    margin angulate or rounded (Pl. III, Figs. 3 & 4) ..... (2)  
    Vertex not at all or barely advanced beyond eyes and usually  
    narrower than one of them, its front margin truncate;  
    front margin of pronotum reaching eyes (Pl. III, Fig. 5) ..... (3)
2. Median carina of pronotum raised in the form of a crest



- and more or less arched lengthwise, its dorsal front margin produced in an angle over the back of the head; posterior process of pronotum usually much abbreviated (Pl. III, Fig. 2) ..... *Nomotettix cristatus* (Scudder)
- Median carina of pronotum low, not arched, its front margin truncate or very obtuse-angulate (Pl. III, Fig. 1) .. Genus *Acrydium*  
*A. subulatum* (Linnaeus)  
*A. incurvatum* (Hancock)  
*A. acadicum acadicum* (Scudder)  
*A. acadicum brunneri* (Bolivar)
3. Antennae 13-segmented; frontal costa not at all sinuate; dorsal surface of pronotum distinctly rugose ..... *Apotettix rugosus* (Scudder)
- Antennae 14-segmented; frontal costa, in profile, feebly but distinctly sinuate in front of the eyes; pronotum granulose, rarely finely scabrous ..... Genus *Paratettix*  
*P. cucullatus* (Burmeister)  
*P. mexicanus mexicanus* (Saussure)

#### FAMILY ACRIDIDAE (Locusts or short-horned Grasshoppers)

Those exceedingly numerous and common grasshoppers from early spring to late autumn belong to the family Acrididae. They are characterized by relatively short antennae, usually shorter than the body. The tarsi are usually three-segmented; the front and middle legs subequal in size, much smaller and shorter than the hind legs which are highly modified for jumping. The tegmina are usually dull colored and thickened; the hind wings membranous, fan-shaped, and may be brightly colored. The ovipositor of the female consists of four short valves projecting from the tip of the abdomen, two of which curve upward and two downward (Pl. III, Fig. 6). The abdomen of the male terminates in the compact subgenital and supra-anal plates which conceal the male reproductive organs (Pl. III, Fig. 7).

The four subfamilies of the Acrididae are individually keyed because of the numerous genera and species represented in the family.

1. Prosternum armed with a distinct conical or cylindrical tubercle or spine (Pl. III, Fig. 8). Tarsal pulvilli exceptionally large ..... Subfamily *Cyrtacanthacrinae*  
Prosternum without tubercle ..... (2)
2. Antennae shorter than front femora. Wings completely absent. Hypothetical in extreme southwestern Utah. Subfamily *Morseinae*. One species. .... *Morsea californica dumicola* Rehn & Hebard<sup>H</sup>  
Antennae longer than front femora ..... (3)
3. Outer margin of hind tibiae armed with an apical spine next to the two apical spurs (apparently with three apical external spurs) (Pl. III, Fig. 17) ..... Subfamily *Romaleinae*  
Outer margin of hind tibiae armed with no apical spine (with only two apical spurs) ..... (4)
4. Median carina of pronotum thread-like, lateral carinae distinct; face usually slanting and forming an angle with the vertex; hind wings never banded or brightly colored;

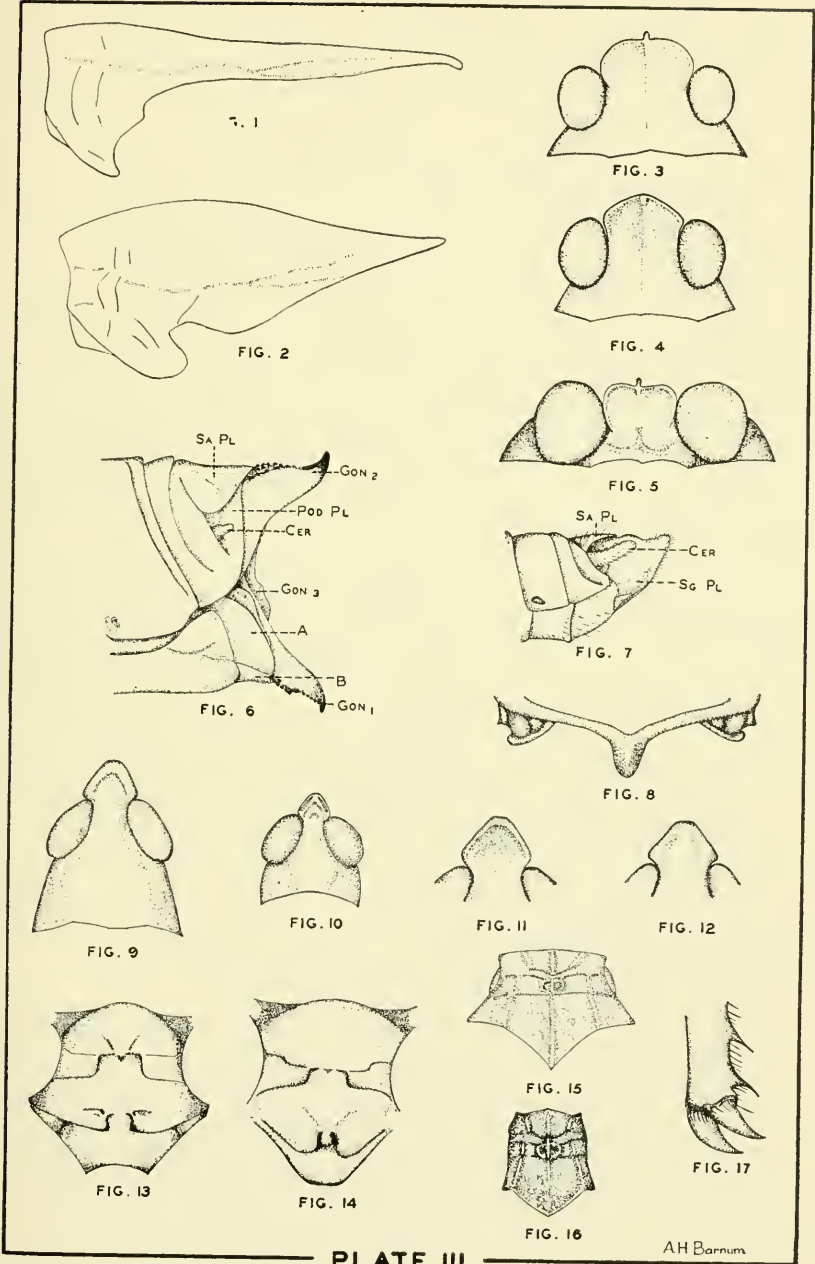


PLATE III

- tarsal pulvilli large ..... Subfamily *Acridinae*  
 Median carina of pronotum usually raised crest-like above  
 the pronotum, lateral carinae poorly developed; face nearly  
 vertical and rounded at meeting with vertex; wings  
 long, hind wings usually brightly colored and with a black  
 band ..... Subfamily *Oedipodinae*

## KEY TO ACRIDINAE

1. Lateral foveolae of vertex forming a right or acute angle  
 with plane of fastigium and invisible from above (Pl. III,  
 Fig. 9); face usually strongly slanting, forming an angle  
 with vertex ..... (2)  
 Lateral foveolae of vertex forming an obtuse angle with  
 plane of fastigium and visible from above (Pl. III, Fig.  
 10); face usually vertical and rounded at meeting with  
 vertex ..... (13)
2. Antennae strongly ensiform; lateral carinae of pronotum  
 parallel or weakly divergent caudad ..... (3)  
 Antennae simple, slightly flattened, or clavate; lateral  
 carinae of pronotum curved ..... (5)
3. Dorsal length of head greater than that of pronotum; form  
 very slender, linear; vertex greatly produced .....  
*Paropomala wyomingensis* (Thomas)\*  
 Dorsal length of head less than that of pronotum; form less  
 slender; vertex less strongly produced ..... (4)
4. Male subgenital plate nearly twice as long as the preceding  
 sternite; size smaller, male 23-27 mm., female 27-30 mm.  
 ..... *Pseudopomala brachyptera* (Scudder)  
 Male subgenital plate shorter than the preceding sternite;  
 size larger, male 26-32 mm., female 26-45 mm. ....  
*Mermiria maculipennis macclungi* Rehn
5. Pronotum saddle-shaped; head distinctly elevated above  
 pronotum ..... (6)  
 Pronotum normal; head not distinctly elevated above pronotum .. (7)
6. Fastigium strongly ascendant, not carinate; antennae very  
 elongate, flattened. .... *Pedioscirtetes nevadensis* Thomas\*  
 Fastigium not strongly ascendant, with a feeble medio-longi-  
 tudinal carina; antennae short and simple .....  
*Boottettix punctatus* (Scudder)
7. Fastigium with surface largely convex, lacking a conspicuous  
 infra-marginal impression (Pl. III, Fig. 12). .... (8)  
 Fastigium of vertex with surface concave or with a con-  
 spicuous infra-marginal impression (Pl. III, Fig. 11) ..... (11)
8. Supplementary carinae absent on head and pronotum; teg-  
 mina and wings usually reduced; lateral carinae of pro-  
 notum straight, parallel, prominent and elevated .....  
*Opeia obscura* (Thomas)  
 Supplementary carinae present on head or pronotum or both .... (9)
9. Internal spurs of caudal tibiae equal ..... (10)  
 Internal spurs of caudal tibiae decidedly unequal .....  
*Eritettix variabilis* Bruner\*
10. Caudal tibiae supplied with more numerous (16 to 18 in  
 female) external spines ..... *Syrbula fuscovittata* Thomas  
 Caudal tibiae supplied with fewer (12 to 15) external spines.  
 ..... Genus *Amphitornus*  
*A. coloradus ornatus* McNeill  
*A. coloradus saltator* Hebard
11. Fastigium of vertex with a medio-longitudinal carina .....  
*Neopodismopsis abdominalis* (Thomas)<sup>H</sup>

- Fastigium of vertex without a medio-longitudinal carina ..... (12)
12. Antennae subensiform; lateral carinae of pronotum well indicated in color, but obsolete or subobsolete in contour ..... Genus *Cordillacris*  
     ..... *C. occipitalis occipitalis* (Thomas)  
     ..... *C. occipitalis cinerea* (Bruner)  
     ..... *C. crenulata crenulata* (Bruner)
- Antennae simple; lateral carinae of pronotum weakly to strongly developed. .... Genus *Orphulella*  
     ..... *O. compta* Scudder  
     ..... *O. pelidna desereta* Scudder
13. Pronotum saddle-shaped, lateral carinae absent; costal field of tegmina expanded .....  
     ..... *Ligurotettix coquillettii coquillettii* McNeill<sup>H</sup>
- Pronotum normal, lateral carinae present; costal field of tegmina normal ..... (14)
14. Antennae clavate in both sexes .....  
     ..... *Aeropedellus clavatus clavatus* (Thomas)
- Antennae simple ..... (15)
15. Face slanting, meeting the vertex at an angle; wings short ..... (16)
- Face nearly vertical and rounded at vertex; wings long or short (17)
16. Form moderately slender; face and eyes oblique; internal spurs of caudal tibiae equal .... *Chorthippus longicornis* (Latreille)
- Form moderately robust; face rounded and moderately oblique, eyes almost vertical; internal spurs of caudal tibiae moderately unequal ..... Genus *Bruneria*  
     ..... *B. alticola* (Rehn)  
     ..... *B. brunnea* (Thomas)\*
17. Median carina of pronotum distinct ..... (18)
- Median carina of pronotum obsolete for most of its length. ....  
     ..... *Heliaula rufa* (Scudder)
18. Hind tibiae blue; median carina of pronotum low on posterior part of prozone and cut by two sulci ..... (19)
- Hind tibiae red or tan; median carina continuous and cut by one sulcus ..... (20)
19. Wings shorter than abdomen; with distinct dark markings on body ..... *Drepanopterna femoratum* (Scudder)
- Wings longer than abdomen; dark markings indistinct. ....  
     ..... *Aulocara elliotti* (Thomas)
20. Hind tibiae buff or pink in color; lateral carina of pronotum continuous and sharply constricted in middle; prozone shorter than metazone ..... Genus *Psoloessa*  
     ..... *P. delicatula delicatula* (Scudder)  
     ..... *P. texana texana* Scudder\*
- Hind tibiae red; lateral carina obsolete on prozone; prozone longer than metazone ..... Genus *Ageneotettix*  
     ..... *A. deorum deorum* (Scudder)  
     ..... *A. deorum curtippennis* Bruner<sup>AC</sup>

## KEY TO OEDIPODINAE

1. Interspace of metasternum linear, or distinctly longer than broad in male; narrower than interspace between the mesosternal lobes in female (Pl. III, Figs. 13 and 14) ..... (2)
- Interspace of metasternum rather broad, quadrate in male, transverse in female ..... (4)
2. Intercalary vein nearer median than ulnar vein; wings brightly colored, red or yellow ..... Genus *Arphia*  
     ..... *A. pseudonietana pseudonietana* (Thomas)  
     ..... *A. conspersa* Scudder
- Intercalary vein midway between or nearer the ulnar than the median vein; wings not brightly colored ..... (3)



3. Intercalary vein nearer the ulnar than the median vein .....  
*Encoptolophus pallidus subgracilis* Caudell\*  
 Intercalary vein midway between the median and ulnar  
 veins ..... *Chortophaga viridifasciata* (DeGeer)
4. Lateral carinae of pronotum not transversely intersected by  
 principal sulcus which is obsolete or indistinct on lateral lobes (5)  
 Lateral carinae of pronotum transversely intersected by  
 principal sulcus which is distinct on lateral lobes ..... (9)
5. Median carina of pronotum conspicuous and well elevated;  
 distal half of tegmina membranous and with quadrate cells .... (6)  
 Median carina of pronotum slight; only distal one-fourth of  
 tegmina membranous ..... Genus *Leprus*  
*L. wheeleri* (Thomas)  
*L. interior* Bruner
6. Wings clear and without fuscous band; pronotum not  
 rugose ..... *Camnula pellucida* (Scudder)  
 Wings decidedly colored, red or yellow, and with fuscous  
 transverse band; pronotum rugose ..... (7)
7. Median carina of pronotum not depressed between two  
 transverse incisions ..... (8)  
 Median carina of pronotum depressed between two trans-  
 verse incisions; or mid-portion of carina depressed if the  
 two incisions are not clear (Pl. I, Fig. 2) ..... Genus *Xanthippus*  
*X. corallipes corallipes* (Haldeman)  
*X. corallipes leprosus* Saussure\*  
*X. corallipes altivolus* Scudder\*  
*X. griseus* Scudder  
*X. calthulus* Saussure
8. Lateral lobes of pronotum slightly wider below than in  
 middle ..... *Cratypedes neglectus* (Thomas)  
 Lateral lobes of pronotum equal, not wider below than in  
 middle (Pl. I, Fig. 2) ..... Genus *Xanthippus*
9. Median carina of pronotum high, cristate, arched on prozone  
 and metazone and with only one deep transverse incision ..... (10)  
 Median carina of pronotum not high and cristate and with  
 two deep transverse incisions ..... (11)
10. Wings without median transverse fuscous band. .... Genus *Dissosteira*  
*D. carolina* (Linnaeus)  
*D. spurcata* Saussure  
 Wings with median transverse fuscous band .... Genus *Spharagemon*  
*S. equale* (Say)  
*S. collare* (Scudder)
11. Posterior margin of pronotum broadly rounded or slightly  
 angulate (Pl. III, Fig. 16) ..... (13)  
 Posterior margin of pronotum decidedly angulate (Pl. III,  
 Fig. 15); median carina of pronotum high, with two deep  
 transverse incisions; lateral prominences present near  
 median carina of pronotum. .... (12)
12. Size larger than 28 mm.; inner face of hind femora marked  
 with blue ..... *Metator pardalinus* (Saussure)  
 Size smaller than 26 mm.; no blue present on hind femora.  
 ..... *Trachyrhachis kiova kiova* (Thomas)
13. Median carina of pronotum cut by two sulci, the anterior one  
 of which is shallow; lateral carinae long and cut by pos-  
 terior sulcus; size large ..... (14)  
 Median carina cut by two nearly equal sulci; lateral carinae  
 of pronotum indistinct or not cut by posterior sulcus; size  
 small, form slender ..... (16)
14. Median carina of pronotum distinct ..... (15)  
 Median carina of pronotum slight ..... Genus *Leprus*
15. Margins of lateral lobes of pronotum nearly parallel (Pl. I,

- Fig. 2) ..... Genus *Xanthippus*  
 Hind margin of lateral lobe of pronotum slightly produced  
 below ..... *Cratypedes neglectus* (Thomas)
16. Posterior angle of lateral lobe of pronotum rounded; with  
 or without a tooth ..... (17)  
 Posterior angle of lateral lobe acutely produced ..... (25)
17. Posterior angle of lateral lobe of pronotum with a tooth ..... (18)  
 Posterior angle of lateral lobe without a tooth ..... (20)
18. Disk of hind wing red; lateral elevations present adjacent  
 to median carina of pronotum ..... *Trepidulus rosaceus* (Scudder)  
 Disk of hind wing not red; lateral elevations of pronotum  
 not present ..... (19)
19. Median carina of metazone elevated ..... Genus *Conozoa*  
       *C. wallula* (Scudder)  
       *C. sulcifrons* (Scudder)  
       *C. constricta* Henderson
- Median carina of metazone very low ..... Genus *Trimerotropis*  
       *T. cristata* McNeill  
       *T. gracilis gracilis* (Thomas)  
       *T. bilobata* Rehn & Hebert\*  
       *T. caeruleipennis* Bruner  
       *T. cyaneipennis* Bruner  
       *T. sparsa* (Thomas)  
       *T. strenua* McNeill  
       *T. citrina* Scudder  
       *T. tolteca modesta* Bruner\*  
       *T. latifasciata* Scudder  
       *T. laticincta* Saussure  
       *T. agrestis* McNeill  
       *T. juliana* Scudder  
       *T. inconspicua* Bruner\*  
       *T. pallidipennis pallidipennis* (Burmeister)  
       *T. titusi* Caudell\*  
       *T. cincta* (Thomas)\*  
       *T. suffusus* (Scudder)  
       *T. arizonensis* Tinkham  
       *T. viriditibialis* Henderson
20. Metazone smooth or with scattered granulations ..... (21)  
 Metazone rugose-tuberculate; lateral prominences present  
 near median carina of pronotum ..... Genus *Derotmema*  
       *D. delicatulum* Scudder\*  
       *D. haydenii rileyianum* Saussure
21. Median carina of pronotum cut nearly in the middle by  
 posterior sulcus; sides of pronotum marked with black.  
 ..... *Mestobregma impezum* Rehn  
 Median carina of pronotum cut considerably before middle  
 by poster sulcus ..... (22)
22. Form robust; antennae long; inner face of hind femora blu-  
 ish-black. .... *Hadrotettix trifasciatus* (Say)  
 Form slender; antennae of normal length; inner face of  
 hind femora not bluish ..... (23)
23. Radiate veins of anal field of wing not swollen .....  
 ..... Genus *Trimerotropis*  
 Radiate veins of anal field of wing distinctly swollen ..... (24)
24. Swollen veins prominent only in anterior half or two-thirds  
 of anal field; wing disk yellowish ..... Genus *Circotettix*  
       *C. rabula rabula* Rehn & Hebard  
       *C. rabula altior* Rehn  
       *C. rabula nigrifasciatus* Beamer  
       *C. verruculata* (Kirby)
- Swollen veins prominent in entire anal field; wing disk col-

- orless or blackish ..... *Aerochoreutes carlinianus strepitus* Rhen  
 25. Posterior margin of pronotum rounded .... *Anconia integra* Scudder  
 Posterior margin of pronotum angulate; disk of hind wings  
 pale yellow ..... *Cibolacris parviceps aridus* (Bruner)

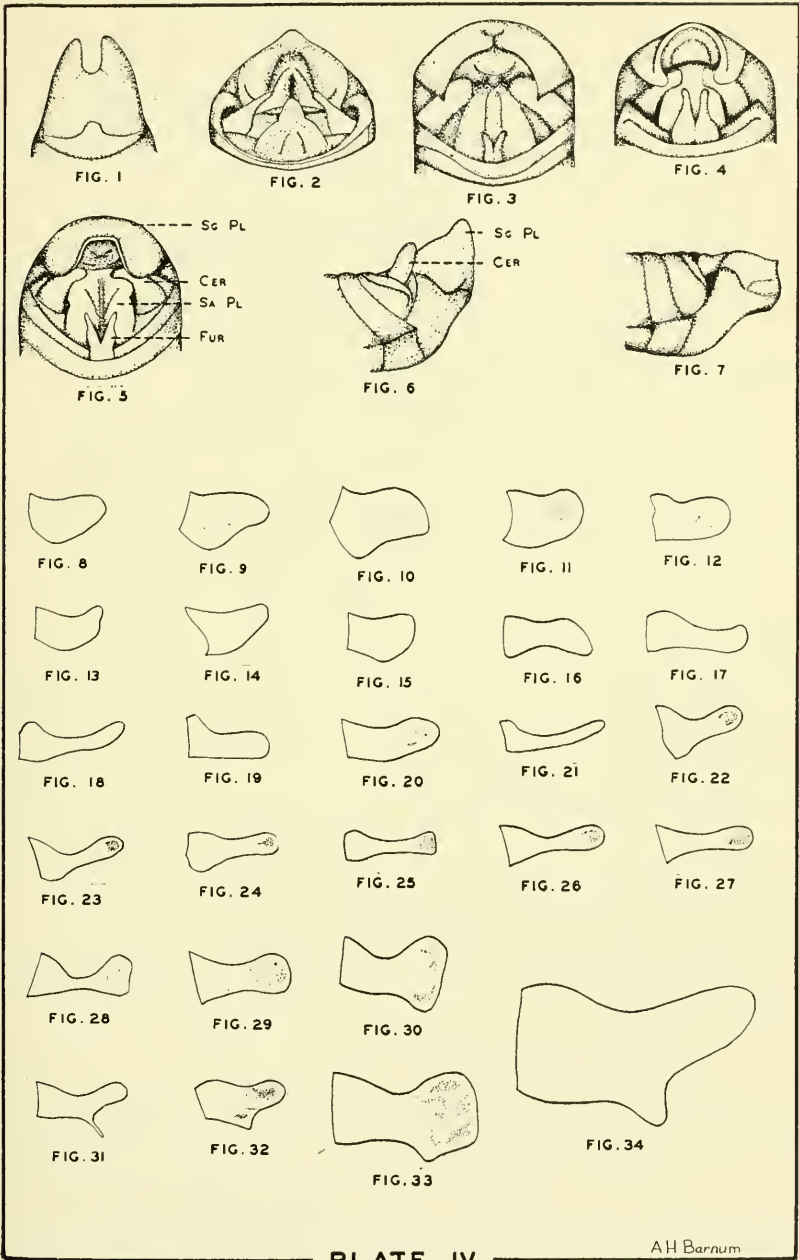
## KEY TO ROMALEINAE

1. Wings or wing pads present; size large, 27 mm. .... (2)  
 Wings absent; size small, 16 mm.; antennae very long .....  
 ..... *Tanaocerus koebeli koebeli* Bruner  
 2. Wings long, fully developed; pronotum smooth, carinae  
 simple ..... *Tytthotyle maculata* Bruner<sup>H</sup>  
 Wings reduced to pads; pronotum flat, broad, elongated,  
 covered with tubercles .... *Phrynotettix tschivavensis* (Haldeman)

## KEY TO CYRTACANTHACRINAE

1. Male subgenital plate with deep apical cleft (Pl. IV, Fig. 1);  
 tegmina and wings very long ..... Genus *Schistocerca*  
       *S. shoshone* (Thomas)  
       *S. alutacea* (Harris)  
 Male subgenital plate not cleft ..... (2)  
 2. Wings completely absent; form small, very broad .....  
       ..... Genus *Bradynotes*  
       *B. kaibab* Hebard  
       *B. obesa* (Thomas)  
 Wings present; form normal ..... (3)  
 3. Tegmina and wings well developed, attaining or exceeding  
 abdominal tip ..... (4)  
 Tegmina and wings reduced to small non-functional pads ..... (7)  
 4. Body color bright green with white dorsal stripe on pro-  
 notum and white lateral patches on thorax; tegmina  
 bluish-green, with very narrow white stripes, .....  
       ..... Genus *Hesperotettix*  
       *H. viridis viridis* (Thomas)  
       *H. viridis pratensis* Scudder  
       *H. viridis nevadensis* Morse  
       *H. viridis terminus* Hebard  
       *H. curtispennis* Scudder  
 Body color not as above ..... (5)  
 5. Tegmina pale greenish; pronotum and caudal femora bluish-  
 green marked with red and yellow .....  
       ..... *Poecilotettix sanguineus* Scudder\*  
 Tegmina and body darker in color; pronotum and caudal  
 femora not marked with red and yellow ..... (6)  
 6. Subgenital plate of male with a subapical cone (Pl. IV,  
 Fig. 2); cerci of male always slender, never broad and flat-  
 tened. .... Genus *Aeoloplus*  
       *A. tenuipennis* Scudder  
       *A. chenopodii* (Bruner)  
       *A. turnbulli turnbulli* (Thomas)  
 Subgenital plate without an apical cone or point (if a  
 minute tubercle is present, the cerci are broad and flat-  
 tened). .... Genus *Melanoplus*  
       *M. marshalli marshalli* (Thomas)  
       *M. marshalli ascensor* (Scudder)  
       *M. occidentalis occidentalis* (Thomas)  
       *M. occidentalis brevipennis* Bruner\*  
       *M. cuneatus* Scudder\*  
       *M. rugglesi* Gurney  
       *M. herbaceus* Bruner\*  
       *M. pictus* Scudder  
       *M. bowditchi bowditchi* Scudder\*





- M. bowditchi canus* Hebard<sup>AC</sup>  
*M. flavidus flavidus* Scudder\*  
*M. kennicotti kennicotti* Scudder<sup>AC</sup>  
*M. bruneri* Scudder\*  
*M. mexicanus mexicanus* (Saussure)  
*M. mexicanus bilituratus* (Walker)  
*M. devastator* Scudder  
*M. dawsoni* (Scudder)<sup>AC</sup>  
*M. bohemani* (Stal)\*  
*M. saltator* Scudder  
*M. fasciatus* (F. Walker)  
*M. borealis palaceus* Fulton<sup>AC</sup>  
*M. borealis utahensis* Scudder  
*M. femur-rubrum femur-rubrum* (DeGeer)  
*M. cinereus* Scudder  
*M. complanatipes complanatipes* Scudder<sup>AC</sup>  
*M. complanatipes canonicus* Scudder  
*M. dodgei* (Thomas)  
*M. angustipennis* (Dodge)  
*M. packardi* Scudder  
*M. foedus foedus* Scudder\*  
*M. solitudinis* Hebard  
*M. alpinus* Scudder  
*M. infantilis* Scudder  
*M. confusus* Scudder  
*M. keeleri luridus* (Dodge)  
*M. differentialis nigricans* Cockerell  
*M. bivittatus* (Say)  
*M. yarrowi* (Thomas)
7. Body color greenish ..... (8)  
 Body color darker ..... (9)
  8. Posterior margin of pronotum angulate; body bright green  
 with full-length dorsal white stripe; sides of pronotum  
 with black patch ..... Genus *Hesperotettix*  
 Posterior margin of pronotum convexly rounded; body uni-  
 formly greenish without stripes ..... Genus *Aeoloplus*
  9. Pronotum with distinct lateral keels ..... Genus *Oedaleonotus*  
*O. enigma* (Scudder)  
*O. borckii orientis* Hebard<sup>AC</sup>  
 Pronotum without keels ..... (10)
  10. Head excessively large in proportion to pronotum, wider,  
 even excluding the eyes, then the pronotum .....  
*Phoetaliotes nebrascensis* (Thomas)  
 Head normal in size ..... Genus *Melanoplus*

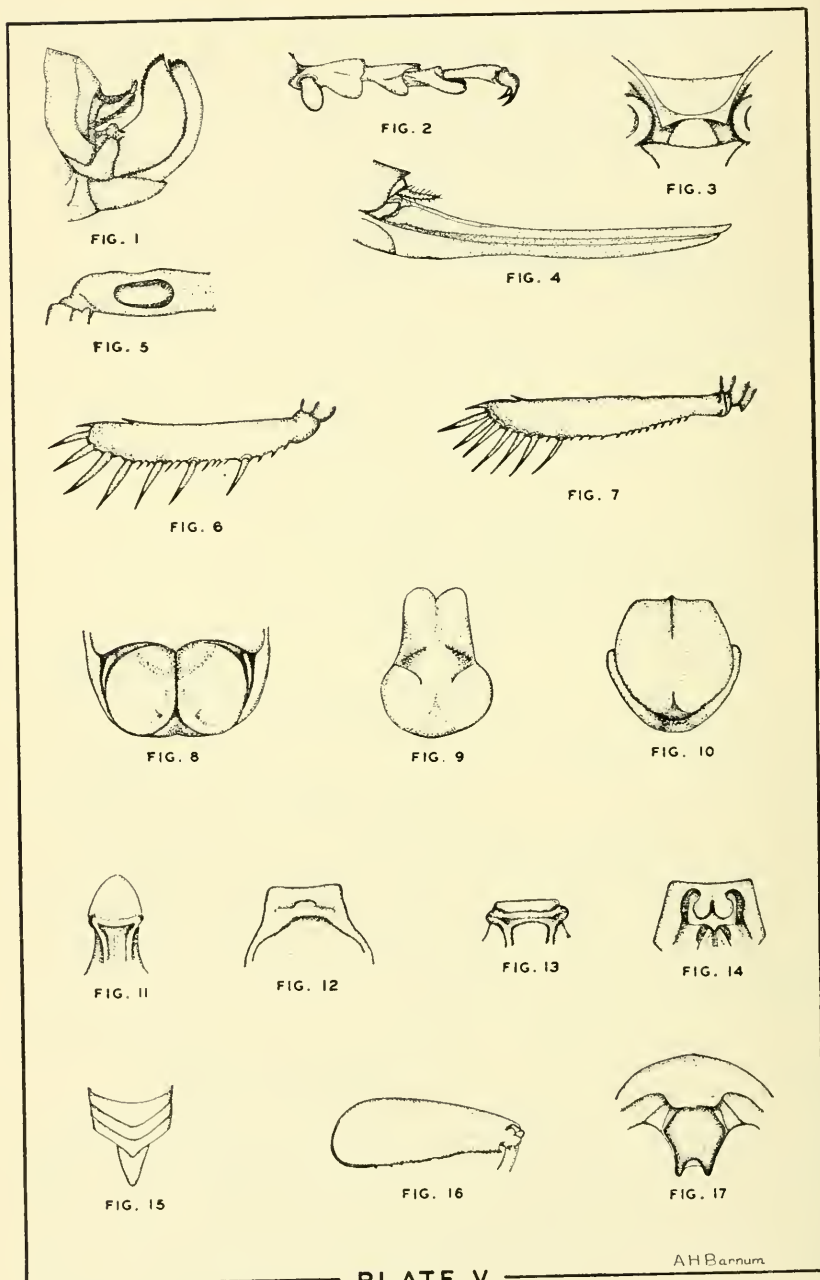
FAMILY TETTIGONIIDAE (Long-horned Grasshoppers, Katydid, etc.)

Many different and distinct forms can be found among the long-horned grasshoppers, but definite morphological characteristics show their relationships to one another. All members of the family have extremely long, finely tapered antennae and four-jointed tarsi, without pads between the claws. The females have a compressed, blade-like ovipositor. The hearing organs are situated on the front tibiae, and the tegmina of the males are modified to form a sounding-board for the stridulating apparatus.

1. Wings present or represented by short pads; front tibiae

- with auditory organs (Pl. V, Fig. 5) ..... (2)
- Wings absent; front tibiae without auditory organs ..... (5)
2. Mostly long-winged green species; first two tarsal segments without lateral grooves; ovipositor broad, flat, curved sharply upward (Pl. V, Fig. 1). (Subfamily Phaneropterinae) .... (6)
- Mostly short-winged; tegmina as long as wings; ovipositor long, narrow (Pl. V, Fig. 4) ..... (3)
3. Form slender; pronotum normal in size; hind tarsi without plantula. (Subfamily Conocephalinae) ..... (4)
- Form robust; pronotum large, produced over base of abdomen, often concealing rudimentary female tegmina; hind tarsi with free plantula at base of first segment (Pl. V, Fig. 2). (Subfamily Tettigoniinae) ..... (9)
4. Prosternal spines cylindrical, slender; body 18 mm. or longer; ovipositor upcurved ..... *Orchelimum gladiator* Bruner<sup>AC</sup>
- Prosternal spines very short or wanting; body less than 17 mm.; ovipositor nearly straight; wings usually short. .... *Conocephalus fasciatus vicinus* (Morse)\*
5. Head large; antennal bases widely separated; tarsi with pulvilli. (Subfamily Stenopelmatinae)<sup>2</sup> ..... *Stenopelmatus fuscus* Haldeman
- Head smaller; antennal bases very close together; tarsi without pulvilli. (Subfamily Rhaphidophorinae)<sup>2</sup> ..... (18)
6. Size small, less than 38 mm.; tegmina narrow, hind margin usually sinuate; pronotum saddle-shaped ..... (7)
- Size large, more than 38 mm.; pronotum not saddle-shaped; pronotum with hind margin broadly rounded ..... (8)
7. Comparatively robust species; tegmina broad, frequently barred with white; hind wings not over 7 mm. longer than tegmina. .... Genus *Insara*
- ..... *I. elegans elegans* (Scudder)<sup>11</sup>
- ..... *I. elegans consuetipes* (Scudder)<sup>11</sup>
- Extremely slender, long-legged species; wings, if present, uniformly colored and tegmina more than 7 mm. shorter than hind wings. .... Genus *Arethaea*
- ..... *A. coyotero* Hebard<sup>11</sup>
- ..... *A. gracilipes gracilipes* (Thomas)\*
8. Tegmina long and narrow, but little wider at middle than at apex; fastigium between antennae little wider than first antennal segment ..... *Scudderia furcata furcifera* Scudder
- Tegmina distinctly wider at middle than at apex; fastigium much wider than first antennal segment ..... *Microcentrum rhombifolium* (Saussure)\*
9. Wings short, rarely longer than pronotum and often, especially in female, rudimentary or wanting ..... (10)
- Wings fully developed, extending far beyond tip of abdomen in both sexes ..... Genus *Capnobotes*
- ..... *C. fuliginosus* (Thomas)
- ..... *C. occidentalis* (Thomas)
10. Prosternum armed with a pair of indistinct, sharply triangular spines (Pl. V, Fig. 3) ..... *Eremopedes ephippiatus ephippiatus* (Scudder)\*
- Prosternum unarmed ..... (11)
11. Pronotum without indications of lateral carinae on anterior half or indicated only by color ..... (12)
- Pronotum with persistent lateral carinae (except sometimes on posterior fourth) ..... (15)
12. Hind femora, except in young specimens, less than twice as

2. Recent authors have placed the Stenopelmatinae and Rhaphidophorinae into a separate family, the Gryllicrididae.



- long as pronotum ..... *Anabrus simplex* Haldeman  
 Hind femora more than twice as long as pronotum ..... (13)
13. Tegmina of female not projecting beyond pronotum, of  
 male rarely projecting one-half the length of pronotum ..... (14)  
 Tegmina of female projecting somewhat beyond pronotum,  
 of male projecting one-half or more than one-half the  
 length of pronotum ..... Genus *Idiostatus*  
     *I. hendersoni* Hebard  
     *I. variegata* Caudell<sup>AC</sup>
14. Size large, pronotum 12 mm. or more in length; pronotum  
 with distinct lateral and median carinae on posterior half;  
 posterior femora less than two and one-half times as long  
 as pronotum; ovipositor curved lightly upward .....  
     ..... *Anabrus simplex* Haldeman  
 Size smaller, pronotum 8 mm. or less in length; pronotum  
 without carinae on posterior half; posterior femora more  
 than two and one-half times as long as pronotum; ovipos-  
 itor usually more noticeably curved upward .....  
     ..... *Eremopedes ephippiatus ephippiatus* (Scudder)\*
15. Hind femora short, less than twice as long as pronotum;  
 posterior tibiae with four apical spines below .....  
     ..... Genus *Plagiostira*  
     *P. albonotata albonotata* Scudder  
     *P. gillettei* Caudell  
 Hind femora long, twice or more as long as pronotum ..... (16)
16. Lateral lobes of pronotum declivant, slightly so in *Steiroxys*;  
 posterior femora three or more times as long as pronotum,  
 much swollen in basal half ..... (17)  
 Lateral lobes of pronotum perpendicular, or almost so;  
 posterior femora little if any more than twice as long as  
 pronotum ..... Genus *Plagiostira*
17. Tegmina well developed, overlapping above and projecting  
 about one-half the length of pronotum in both sexes .....  
     ..... *Clinoppleura melanoppleura* (Scudder)  
 Tegmina of female forming slightly projecting lateral pads,  
 widely separated above ..... Genus *Steiroxys*  
     *S. pallidipalpus* (Thomas)  
     *S. trilineatus* (Thomas)
18. All tarsi 4-segmented ..... (19)  
 Front or front and hind tarsi 3-segmented, the two proxi-  
 mal segments fused ..... (20)
19. Dorsal surface of front tibiae with a stout spur slightly dis-  
 tad of middle of front margin .... *Udeopsylla robusta* (Haldeman)  
 Dorsal surface of front tibiae unarmed except at apex .....  
     ..... Genus *Ceuthophilus*  
     *C. utahensis* Thomas  
     *C. mormonius* Hubbell  
     *C. wasatchensis* Hubbell  
     *C. unguiculatus* Hubbell  
     *C. arizonensis* Scudder  
     *C. gertschi* Hubbell  
     *C. fusiformis* Scudder  
     *C. caudelli* Hubbell  
     *C. hebardi* Hubbell  
     *C. fossor* Hubbell  
     *C. lamellipes* Rehn
20. Front tarsi alone 3-segmented ..... *Daliniodes hastiferum* Rehn\*  
 Both front and hind tarsi 3-segmented ..... (21)
21. Dorsal margins of hind tibiae with five relatively short, very  
 heavy spurs (exclusive of calcars), these rather widely



- separated (Pl. V, Fig. 6); large, robust, heavily sclerotized insects ..... *Daihinia brevipes* Haldeman\*  
 Dorsal margins of hind tibiae with seven very long spurs  
 (exclusive of calcars), closely crowded in distal half of  
 tibiae (Pl. V, Fig. 7) .. *Ammobaenetes phrixocnemoides* (Caudell)\*

#### FAMILY GRYLLIDAE (Crickets)

The crickets, like the Tettigoniidae, have long, delicately tapering antennae and auditory organs on the front tibiae. The males have stridulatory organs on the tegmina. They differ from the long-horned grasshoppers, however, in having three-jointed tarsi, an awl-like or needle-like ovipositor, and tegmina which are flat above and bent sharply downward at the sides of the body. These insects are essentially nocturnal, but are also active to a considerable extent during the day. Some are among the most numerous and common insects and are widely distributed; others are exceedingly rare and very local in distribution.

1. Hind tibiae armed with rows of long spines ..... (2)  
 Hind tibiae without rows of long spines, but with rows of  
 short teeth; body covered with scales. (Subfamily Mogoplistinae) ..... *Cycloptilum comprehendens interior* Hebard
2. Form robust; brown or black; head vertical ..... (3)  
 Form slender; greenish; hind tibiae armed with long, delicate spines with minute teeth between; head horizontal.  
 (Subfamily Oecanthinae) ..... Genus *Oecanthus*  
     *O. niveus* (DeGeer)  
     *O. californicus californicus* Saussure\*  
     *O. californicus pictipennis* Hebard  
     *O. nigricornis quadripunctatus* Beutemuller\*  
     *O. nigricornis argentinus* Saussure
3. Wingless; hind femora enormously enlarged; eyes small;  
 of minute size. (Subfamily Myrmecophilinae) .....  
     ..... *Myrmecophila manni* Schimmer\*  
 Winged at least in the adult male; medium to large size;  
 spines of hind tibiae without small teeth between ..... (4)
4. Hind tibiae armed with fixed long spines; no large bristles  
 on body or legs; medium to large size, 12-22 mm. (Subfamily Gryllinae) ..... (5)  
 Hind tibiae armed with long, movable spines; many bristles  
 on body and legs; size smaller. (Subfamily Nemobiinae)  
     ..... Genus *Nemobius*  
     ..... *N. fasciatus fasciatus* (DeGeer)  
     ..... *N. carolinus neomexicanus* Scudder\*  
     ..... *N. mormonius* Scudder
5. Fore wings of male with three to six transverse veins; large  
 in size; very common; hind tibiae with five to eight spines  
 on each upper margin ..... *Gryllulus assimilis* (Fabricius)\*  
 Fore wings of male with two transverse veins; medium  
 size; hind tibiae with four to six spines on upper margin  
     ..... *Miogryllus lineatus* (Scudder)

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# SYNONYMICAL DATA: DESCRIPTIONS OF NEW HYDROMETRIDAE (HEMIPTERA)

By Carl J. Drake, Ames Iowa

The present paper contains the descriptions of two new species of *Hydrometra* from Peru. The notes and synonymical data on types are based largely upon specimens in the British Museum (Nat. Hist.) and University of Glasgow. I am indebted to Dr. W. E. China of the above Museum for the privilege of studying the types of a number of American water-striders. The types of the new species are in my personal collection.

## HYDROMETRA ARGENTINA Berg

- 1879 *Hydrometra argentina* Berg, Hem. Arg. p. 184 (orig. desc.).
- 1879 *Hydrometra mensor* B. White, Trans. Ent. Soc. London P. 267 (new synonymy).
- 1896 *Hydrometra argentina* Lethierry et Severin, Cat. gen. Hem. Het. 3:54
- 1896 *Hydrometra mensor* Lethierry et Severin, op. cit. p. 54.
- 1898 *Hydrometra mensor* Champion, Biol. Centr.-Amer. Rhyn. 2:124-125 (in part; specimen from Santarem, only).
- 1901 *Limnometra chilensis* Reed, Rev. Chil nat. 5:197 (reprint, p. 103)
- 1909 *Hydrometra argentina* Kirkaldy et Torre-Bueno, Proc. Ent. Soc. Wash. 10(2-3):213 (list.)
- 1909 *Hydrometra mensor* Kirkaldy et Torre-Bueno, op. cit. p. 214 (list).
- 1921 *Hydrometra argentina* Pennington, Lista Hem. Het. Rep. Arg. pt. 2, p. 31.
- 1926 *Hydrometra mensor* Torre-Bueno, Entom. Amer. 7(2):100 & 104-105.
- 1926 *Hydrometra kirkaldyana* Torre-Bueno, op. cit. pp. 101 & 104-105.
- 1926 *Hydrometra husseyi* Torre-Bueno, op. cit. p. 102 & 111-113.
- 1926 *Hydrometra argentina* Torre-Bueno, op. cit. pp. 125-126.
- 1926 *Hydrometra chilensis* Torre-Bueno, op. cit. p. 126.
- 1934 *Hydrometra kirkaldyana* Hungerford et Evans, Ann. Mus. nat. Hung. 27:10.
- 1934 *Hydrometra mensor* Hungerford et Evans, op. cit. pp. 92, 103 & 105.
- 1934 *Hydrometra husseyi* Hungerford et Evans, op. cit. pp. 92 & 105, pl. 12 (3 figs.)
- 1934 *Hydrometra argentina* Hungerford et Evans, cit. p. 107 (list).
- 1934 *Hydrometra chilensis* Hungerford et Evans, op. cit. p. 107 (list).
- 1953 *Hydrometra argentina* Drake, J. Kan. Ent. Soc. 26(1):40-41 (synonymizes *H. chilensis* (Reed), *H. husseyi* Torre-Bueno and *H. kirkaldyana* Torre-Bueno with *H. argentina*).

*H. argentina* Berg is a common and very widely dispersed marsh-treader, ranging from Trinidad, B.W.I., and Panama south far into Argentina and Chile. It is more agile and active than its North American congeners.

After studying the types of *H. mensor* Buchanan-White (Univ. of Glasgow) and *H. argentina* Berg (La Plata Mus., Aug.), I find that the two are identical species and thus synonyms (NEW SYNONYMY). As the original description of *H. argentina* was published

first in the July 1879 issue of Anal. Soc. Cien. Arg. 8(1):23 (reprinted in Dec., 1879, in the collected volume "Hemiptera-Argentina," p. 189) and that of *H. mensor* Buchanan-White in Dec., 1879, in Trans. Ent. Soc. Lond., p. 267, the former name thus has priority by several months. For a discussion of other synonymies and notes on distribution, see the article by Drake (1953, op. cit. pp. 40-41).

#### HYDROMETRA NAIADES Kirkaldy

- 1909 *Hydrometra mensor* Champion, Biol. Centr.-Amer. Rhyn. 2:124 & 125-126 (in part; female specimen, David, Panama).  
 1902 *Hydrometra naiades* Kirkaldy, Entomologist, 25:281 (n. n. for *H. mensor* Champion, nec B.-White).  
 1909 *Hydrometra naiades* Kirkaldy et Torre-Bueno, Proc. Ent. Soc. Wash. 10(3-4): 214 (list; Panama).  
 1926 *Hydrometra naiades* Torre-Bueno, Ent. Amer. 7(2):117 (in part; desc. and notes should be referred to *H. australis* Say).  
 1934 *Hydrometra naiades* Hungerford et Evans, Ann. Mus. Nat. Hung. 28:107 (list of Amer. spp. *Hydrometra*).

The following notes are based upon the female type in British Museum, and are intended to supplement the original description (Champion 1898, p. 125). Anteocular part of head less than twice as long as postocular (78:41); clypeus narrow, nearly twice as long at base as median length, with apex bluntly rounded. Rostrum very long, with apex extending beyond the eyes to the basal fourth of postocular part of head. Antennae dark brownish fuscous with apical half of first segment blackish, measurements—I, 16; II, 35; III, 70; IV, 40. Pronotum 1.55 mm. long; anterior lobe impunctate, save for the encircling row of rather shallow pits just behind collar; hind lobe with a number of large shallow pits (not very numerous). Hemelytra (brachypterous) strap-like, fuscous, barely extending beyond metanotum. Hind femora 3.50 mm. long, extending to middle of sixth abdominal segment. Middle and fore acetabula with four pits (each), two in front of a cleft and two behind it; hind acetabula without pits.

This species is known only from the type. Torre-Bueno (1926, p. 117) wrongly described the female of *H. australis* Say as *naiades*. As *H. myrae* Torre-Bueno is a synonym of *australis*, his comments therefore should be referred to *australis*. The lone specimen recorded from Santarem, Brazil, by Champion (1898, pp. 125-126) is the true *H. mensor* B.-White and inseparable from *H. argentina* Berg.

#### HYDROMETRA METATOR B. White (Figs. 1-4)

- Hydrometra metator* B.-White, J. Linn. Soc. Lond. (Zool. Hung. 28:93-94. 1934.  
*Hydrometra metator* Hungerford et Evans, Ann. Mus. Zool. Hung. 28:93-1934.  
*Hydrometra metator* Costa-Lima, Ins. Bras. Hem. 2:296. 1942.

While I was studying Hemiptera at the British Museum last summer (1953), Dr. W. E. China kindly borrowed the male type of *H. metator* B.-White from the University of Glasgow. In order to expose fully the male processes and acetabular pits, the specimen was floated off the rectangular card and carefully cleaned. These structures were then illustrated by Mr. Arthur Smith, Artist, of the above museum (figs. 1-4).

As can be observed in the illustrations (figs. 2-4), the anterior acetabula have two pits in front of a cleft and one behind it; middle acetabula one in front of a cleft and three behind it; and hind acetabula nine pits. The pits are small and were not plainly visible until after the waxy secretions and glue had been removed. The male processes (fig. 1) of the seventh ventrite were figured at an oblique ventral angle of about 40 degrees. From this angle the left male process could be drawn from ventral aspect so as to show size, form and position on segment as well as arrangement and density of bristly hairs around the rim, and the right process from almost lateral aspect. The above structures were wrongly described by Hungerford and Evans, *op. cit.*, p. 93. *Metator* is a very distinct species and known only from the type.

#### HYDROMETRA CARAIBA Guerin-Meneville

1856 *Hydrometra caraiba* Guerin-Meneville, in Sagra's Cuba Ins. 7(2): 173.

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1926 *Hydrometra championi* Torre-Bueno, *op. cit.* pp. 103 & 119-120. (NEW SYNONYMY)

1934 *Hydrometra caraiba* Hungerford and Evans, Ann. Mus. Nat. Hung. 28:91 & 94, 2 figs.

1934 *Hydrometra championiana* Hungerford and Evans, *op. cit.* pp. 91 & 94, 2 figs.

Ever since Torre-Bueno (1926, p. 119) proposed the name *H. championiana* for the species Champion (1898, p. 124) called *caraiba*, there has been constant confusion relative to these names. As the types of *H. championiana* are in the British Museum (Nat. Hist.), Torre-Bueno's notes and redescription of *championiana* were based entirely upon specimens so determined by him from Guatemala (Gaulan) and Colombia (Rio Frio). In other collections Torre-Bueno also determined *H. zeteki* Drake and *H. acapulcana* Drake as *championiana*.

During the past summer (1953) I studied the types of *H. championiana* in the British Museum. As these specimens do not differ specifically from specimens of *H. caraiba* from Cuba, Haiti



and Central America, *championiana* is here placed in synonymy (NEW SYNONYMY). Specimens of *H. caraiba* have been examined from Mexico, Honduras, Panama, Guatamala, Colombia, Venezuela, British Guiana, Cuba, and Haiti.

**HYDROMETRA FUANUCANA** Drake, n. sp.

Long, rather slender, brown with hemelytra dark fuscous. Head blackish fuscous with base brown, moderately enlarged at apex, 4.60 mm. long, with ventral interocular groove short and shallow, the anteocular part nearly three times as long as postocular (63:22). Rostrum pale brown, with apex extending between eyes. Antennae fuscous, long; first segment moderately incrassate, black-fuscous, shining, narrowly embrowned at base; measurements—I, 13; II, 19; III, 95; IV, 41. Legs very long, fuscous with tibiae mostly brownish; anterior femora a little longer than the head; hind femora much longer than the abdomen (140:105).

Pronotum with front lobe about one-half as long and hind part, impunctate save for the transverse row of moderately large pits just back of the narrow collar; hind lobe with median longitudinal frosted line impressed and beset with a row of pits, surface on each side of median line with very many deep, rather small pits not arranged in regular rows, the pits on hind lobe slightly smaller than those behind collar. All acetabula deeply pitted; anterior acetabula with 9-10 pits in front of a cleft and 12-13 behind it; middle acetabula with 9-13 pits in front of a cleft and 12-13 back of it; hind acetabula with 15-17 pits; propleura with 12-15 pits, arranged in a long basal row and either one or two short rows above it. Abdomen with first six tergites smooth, black, shining, the seventh tergite brownish and roughened with small spinulae; connexivum blackish fuscous, brownish on median line. Hemelytra extending nearly to the middle of sixth tergite, dark fuscous with a couple pale streaks.

Male: Seventh ventrite with rounded processes (one on each side) which are situated just behind the middle of segment, each process beset with moderately long, stiff, black hairs (thick in basal half and then only a few on rim of posterior part), distance between processes about equal to the diameter of one of them, surface not impressed within processes, the latter not extending to hind border of segment; eighth ventrite deeply broadly impressed on each side, with a broad median smooth ridge between impression, with a few scattered pale hairs in posterior part of each impression, with several much longer hairs behind each impression.

Female: Seventh tergite elevated backwards, with small tufts of hairs (one on each side) on hind margin; eighth tergite slowly narrowed and sloping downward posteriorly, suddenly narrowed behind and terminating in a sharp point.

Length, 13.75-15.00 mm.

*Type* (male) and *allotype* (female), both macropterous, "Cu-charos," Dept. of Faunuco, on small ponds near the bank of River Huallago, Peru, August, 1954. *Paratypes*: 4 specimens, taken with type.

**HYDROMETRA HUALLAGANA** Drake, n. sp.

Long, rather slender, brownish fuscous. Head fuscous-black with basal part brown, moderately widened in front; anteocular part three times as long as postocular (65:22); ventral ocular groove shallow, not longer than an eye; clypeus dark reddish brown, shining, slightly longer than wide, obtusely angulate in front; rostrum brownish with apex dark fuscous, scarcely extending beyond front margins of eyes. Antennae very long, fuscous; first segment blackish with brownish base, shining, moderately swollen; measurements—I, 28; II, 64; III, 210; IV, 85. Legs very long, fuscous; anterior femora extending beyond apex of clypeus; hind femora much longer than abdomen (155:120).

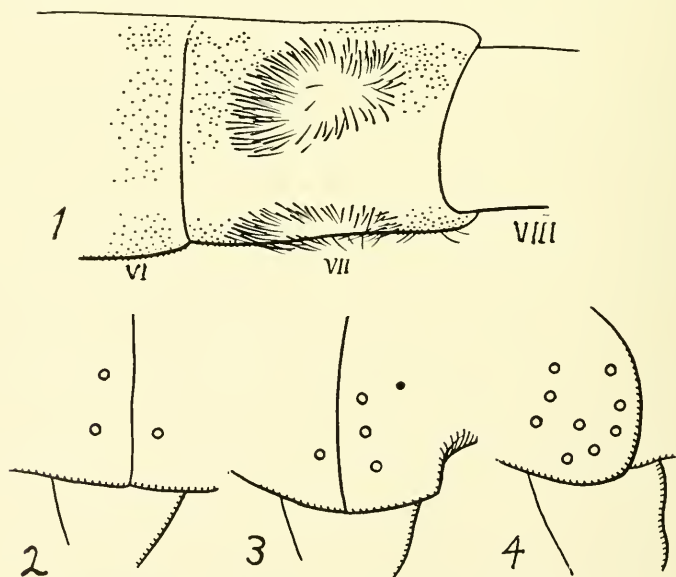
Pronotum 2.50 mm. long, with the median longitudinal line extending from base almost to collar; anterior lobe about one-half as long as hind, with an encircling row of moderately large deep pits just behind narrow collar, otherwise impunctate, even in frosted median line; hind lobe with a row of pits in frosted line, with very many, rather small, deep and very distinct pits on each side of median line. All acetabula with numerous deep pits, which are a little larger than ones on hind pronotal lobe; fore acetabula with 7-8 pits in front of a cleft and 9-11 behind it; middle acetabula with 7-11 pits in front of a cleft and 10-11 behind it; hind acetabula with 15-18 pits; propleura with 8-12 pits, arranged in a long basal and one or two shorter rows. Abdomen with first six tergites greyish black-fuscous, smooth, shining, the seventh tergite roughened with spinulae; connexiva dark fuscous with broad, median, brown stripe; venter dark fuscous, the sterna brownish. Hemelytra (brachypterous) extending a little beyond base of abdomen, brownish with raised veins dark fuscous, (macropterous) extending to base of seventh tergite, brown with broad median stripe dark fuscous, usually much paler on each side of stripe.

Male: Abdomen with six, seventh and eighth ventrites sparsely clothed with long pale hairs; seventh ventrite with a large, impressed, apical area (one on each side) extending from a little in front of middle almost to apex of segment), densely bordered in front and thinner on the exterior side with long, stiff, black hairs, the inner side and behind open, almost without hairs, the surface within process sparsely clothed with very short, pale hairs and lightly frosted; eighth ventrite quite deeply broadly impressed on each side, without a prominent median ridge, somewhat frosted; eighth tergite terminating behind in a slightly upturned, pointed process. Female: Seventh tergite raised backwards; eighth tergite narrowed and sloping downwards, terminating posteriorly in a sharp point.

Length, 14.00-16.00 mm.

*Type* (macropterous male) and *allotype* (brachypterous female), "Cucharos" Dept. of Faunuco, River Huallago, in boggy ponds on bank, Peru, August, 1954. *Paratypes* 4 examples, taken with type.

Probably most closely allied to *H. williamsi* Hungerford and Evans, but readily separated from it by number of pits in acetabula. The male processes are somewhat similar in the two species.



*Hydrometra metator* B. White (male type).  
Fig. 1, 7th ventrite showing male processes.  
Fig. 2, fore acetabula showing pits. Fig. 3, middle acetabula. Fig. 4, posterior acetabula.



## TWO NEW LAELAPTID SNAKE MITES FROM KOREA

(Acarina: Laelaptidae)

TED TIBBETTS<sup>1</sup>

While serving with the 5th Air Force in Korea during 1953, I collected a series of new laelaptid mites from two species of snakes. Most of these mites were located under the scales in the ventral area of the head. However, a few were found beneath scales on other parts of the body.

Dr. Vasco M. Tanner of the Brigham Young University, Provo, Utah was kind enough to identify these snakes as *Elaphe dione* (Pallas) and *Natrix tigrina lateralis* (Berthold).

Radford (1946) established a new genus *Ophidilaelaps* for a laelaptid mite taken from a copper-headed rat snake (*Coluber radiatus* Schlegel) collected in Imphal, Manipur State, India. The sternal plate in this genus is broader than long and is provided with one or two pair of setae.

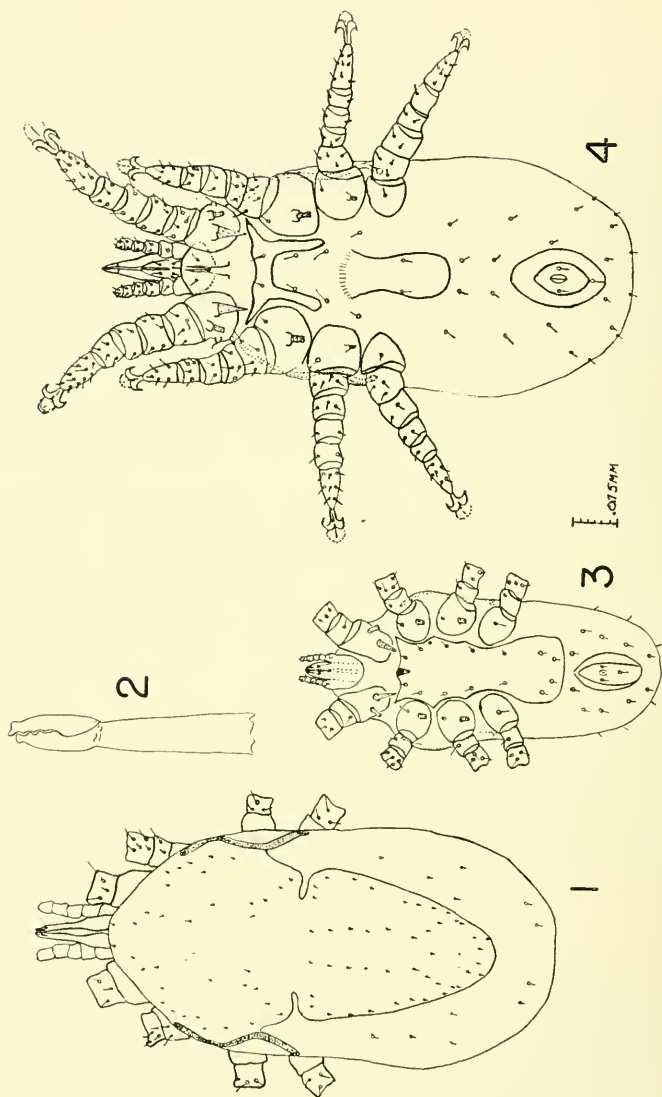
In 1918, Berlese gave a short description of a laelaptid mite found on snakes at Florence, Italy and named this species *Laelaps piger*; however Radford concludes that this is not a true *Laelaps*, because of the presence of only two pairs of setae on the sternal plate and in having only one pair of setae on the genito-ventral plate. The dorsal plate is also partially divided in an area located between the third and fourth coxae and therefore this mite was renamed *Ophidilaelaps piger* (Berlese).

The two species of snake mites discussed in this paper follow Radford's genus *Ophidilaelaps* in having a reduced sternal plate with one or two pair of sternal setae and one pair of setae on the genito-ventral plate. A partial or fully divided dorsal plate appears to be a species variation.

### OPHIDILAEALAPS **TANNERI** n. sp.

*Female*. (Fig. 4, plate I). Body length, excluding gnathosoma, 747 u and body width 390 u. *Venter*. Antero-lateral angles of the sternal plate projecting between coxae I and II; anterior margin convex; lateral margin slightly concave; posterior margin concave; posterior lateral projections of sternal plate level with anterior edge of coxae III. Only the first pair of sternal setae are borne upon the sternal plate; second pair of setae are level with middle of coxae II, just on the inside of the posterior lateral projection of the sternal plate; third pair of setae at the posterior lateral angles, even with the anterior edge of coxa III; fourth pair of setae slightly below the middle of

1. Captain (MSC) United States Air Force.



Explanation of Plate I — *Ophidilaclaps tanneri* n. sp.

Fig. 1, Female dorsal; Fig. 2, Female, chelicera; Fig 3, Male, ventral; Fig. 4, Female, ventral.

coxa III. The 2nd, 3rd and 4th pair of satae do not appear to be borne upon the sternal plate. Some specimens examined had the

second pair of setae on the edge of the posterior lateral projection. Genito-ventral plate flask-shaped, bearing the paired genital setae level with the posterior edge of coxa IV. Anal plate ovoid, 168 u long and 99 u wide; anus in middle of plate. The paired anal setae level with middle of anus; unpaired seta at the posterior end of anal plate.

Posterior to the genito-ventral plate and anterior to the anal plate, in the soft integument of the opisthosoma, are four pairs of setae. Flanking the anal plate are two pairs of setae and close to the posterior margin of the body are two pairs of setae, with three pairs of setae on the posterior margin. *Dorsum*. (Fig. 1.) In the female the dorsal plate is partially divided. The anterior portion covers the dorsum from the anterior margin of the body to the level of leg IV. The dorsal plate is partially divided at a level of leg IV; then converging to a rounded point posteriorly, leaving an exposed area of soft integument between it and the posterior-lateral margin of the body. On the anterior portion of the dorsal plate are 19 pairs of setae and on the posterior portion of the dorsal plate are 23 pairs of setae. Six pairs of setae are borne on the soft integument, posterior to the dorsal plate.

*Legs*. Legs short and stout. Legs I stouter than II, III and IV. Coxae I is provided with a stout distal spur 49 u long and 19 u wide at the base and a short median spur 24 u long; coxae II and III have one seta each and a short spur. The spur on coxae II is bifid. On some paratypes the median spur on coxae I and the spur on coxae II and III are bifid. Coxae IV with one simple seta. Peritremes extending from coxae IV to the middle of coxae I and II.

*Gnathosoma*. Chelicerae chelate; (Fig. 2); movable finger has three teeth and unmovable finger has two teeth with a tooth-like hooked end on the movable finger; chela 33 u long. Palps of usual form 105 u long from base of trochanter to tip. Hypostome 66 u long with three pairs of setae, extends to the posterior margin of palpal tibia. Tritosternum not barbed, 105 u long. *Male* (Fig. 3). Length from posterior margin to the anterior tip of the dorsal plate 546 u. Maximum width 247 u. Chela 45 u long. Palps of usual form 81 u long from tip to base. Hypostome 60 u long. Male similar in appearance to the female.

Host -Snake (*Natrix tigrina lateralis* (Berthold)).

Locality-Seoul, Korea, 20 May 1953.

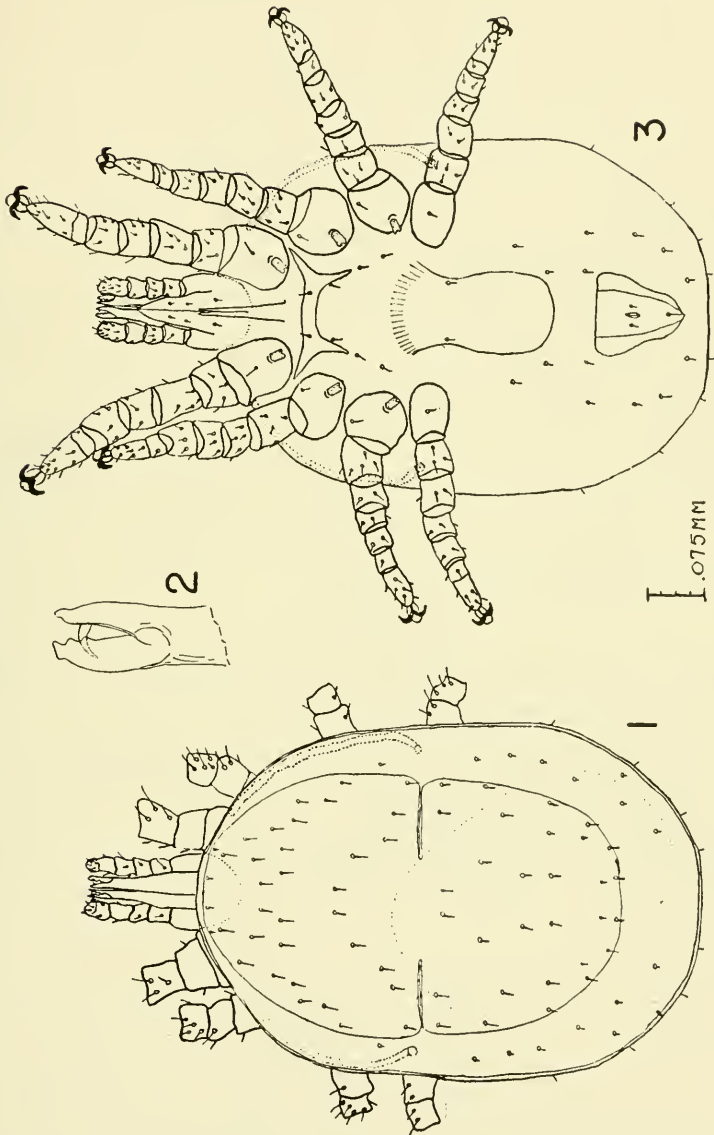
Material-Holotype female and allotype male and four paratype females deposited in the U. S. National Museum. U.S. Nat. Mus.

No. 2201.

Remarks—Ten females and one male were collected from a snake *Natrix tigrina lateralis* (Berthold) near Seoul, Korea, 20, May, 1953. The snake was chloroformed and placed under a stereoscope microscope for observation. The majority of mites were located on the ventral side of the head under the scales. However, a few were found under the lateral scales of the body. In most cases the hysterosoma was protruding from under the scales and the mite was easily located. *Ophidilaelaps tanneri* differs from all other species in this genus in having a stout distal spur and short median spur on coxae I and in having a partially divided dorsal plate at a level of leg IV. The sternal plate has one pair of setae. This mite has been named for Dr. V. M. Tanner, eminent professor, who has inspired many students in the study of zoology at Brigham Young University, Provo, Utah.

OPHIDILAEALAPS **FARRIERI** n. sp.

*Female.* (Fig 3, Plate II). Body length excluding gnathosoma, 637 u and body width 468 u. *Venter.* The sternal plate has the same shape as *O. tanneri* except the posterior lateral projections of the sternal plate only extend slightly past the center of coxae II. The first pair of sternal setae are located on the sternal plate; second pair of setae are level with middle of coxae II, just on the inside of the posterior lateral projection of the sternal plate; third pair of setae at the posterior end of the lateral projection; fourth pair of setae even with the middle of coxae III. The genito-ventral plate is drop-shaped, bearing one pair of genital setae level with coxae IV. Anal plate triangular, 123 u long and 142 u wide; anus in center of plate. The paired anal setae level with middle of anus; unpaired seta at the posterior end of anal plate. Posterior to the genito-ventral plate and anterior to the anal plate in the soft integument of the opisthosoma are four pairs of setae. In the area on each side of the anal plate are three pairs of setae and on the posterior margin are four pairs of setae. Peritremes extending from the middle of coxae IV to the middle of coxae I. *Dorsum.* (Fig. 1). The dorsal plate is partially divided at a level with coxae IV; eighteen pairs of setae on the anterior half of the dorsal plate, and fifteen pairs of setae on the posterior half. An exposed area of soft integument lies between the dorsal plate and the posterior-lateral margin of the body; eight pairs of setae are located in this area. *Legs.* (Fig. 3). Legs are rather stout. Legs I stouter than legs II, III and IV. All setae on legs are



Explanation of Plate II — *Ophidilaelaps farrieri* n. sp.

Fig. 1, Female, dorsal; Fig. 2, Female, chela; Fig. 3, Female, ventral.

spine-like. Femur and genu have three or four pairs of extra long stout dorsal setae. Coxae I, II and III are each provided with a stout distally bifid spur and seta. Coxae IV each with a simple seta. Chaetotaxy of ventral side of legs as figured. Claws well developed. *Gnathosoma*. Palps five segmented; hypostome extends to the center of palp tibia. Three pairs of setae on hypostome as figured. Chelicera (Fig. 2) with a pilus dentilis.

Male-unknown.

Host—*Elaphe dione* Pallas.

Location—Aesium-Ni, Korea, 23, May, 1953.

Material—Holotype female deposited in the U.S. National Museum. U.S. Nat. Mus. No. 2202.

Remarks—One female *Ophidilaelaps farrieri* was found under a lateral scale about two inches from the head of a snake, *Elaphe dione* Pallas, in Korea. This mite differs from other *Ophidilaelaps* in that coxae I, II and III are each provided with a stout distally bifid spur and seta. Paired anal setae are lateral, not posterior to anus. The dorsal plate is divided at a level of coxae IV. This mite has been named after Lt. M. H. Farrier, a fellow Acarologist in Korea, who made the days pass faster.

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STUDIES IN THE WEEVILS OF THE  
WESTERN UNITED STATES,

No. VIII: Description of New Species<sup>(1)</sup>

VASCO M. TANNER<sup>(2)</sup>

Professor of Zoology and Entomology

Brigham Young University

In 1951 while critically studying the genera *Bagous* and *Pandeleteius*, the following species did not agree with species then known. Subsequent studies of these genera, as represented in the Entomological Collections of the California Academy of Sciences at San Francisco, have prompted the preparation of this paper in which four species are proposed as new to science and not previously described. While this paper was being made ready for the printer, Mr. John N. Belkin of the University of California at Los Angeles sent several specimens of what has proved to be a new species of *Onychylis*. A description of this species is included in this study.

BAGOUS **ANGUSTUS** Tanner, n. sp.

Black with a grayish coating over the body; prothorax narrow, tapering from the base to the apex, in width two thirds that of the base of the elytra. Elytra straight from humeral prominence to the declivity; rostrum black, longer than the length of the prothorax; scape origin near the apical third of the beak, extending back in a well developed groove to and in contact with the middle of the eye, which is large and well protected by an expanded prothoracic shield; funicle and club as long as the scape; second funicular joint longer than five succeeding ones; club larger, as long as, the seven joints of funicle; antennae and legs reddish brown; third joint of the tarsi not much expanded and not emarginate; fourth segment short with small divergent claws; prothorax finely punctate with a slight medium depression, tapering from base to apex; small fovea partially concealed by the grayish scales of the head; elytral intervals flat, with pale spots beyond the middle on the second and third interspaces; one posterior tubercle on the fifth interspace.

Length 3.1 mm., width at base of elytra 1.4 mm.

Type - a perfect unique specimen, in the author's collection.

Type Locality - Newman Lake, Washington; collector M. C.

1. Contribution No. 133 from the Department of Zoology and Entomology.

2. Supported by a grant-in-aid from the National Science Foundation.



Lane, July 9, 1927. Truck crop No. 1409.

I have hesitated to describe this species from a single specimen, but since it is so distinct from other known species, and because I have not been successful in getting other specimens from this area, it is thought advisable to name it at this time.

*Angustus* has the third joint of the tarsi only slightly enlarged and not emarginate; prothorax finely punctate with a medium fine channel; prothorax, at base, two-thirds the width of the elytra, tapering from base to apex which is a distinctive characteristic. Elytral intervals flat, striae shallow. *Nebulosa* is closely related to *angustus*, but differs in the shape of the prothorax; third tarsal segment; deeper elytral striae and more arched intervals; declivity not so abrupt.

BAGOUS **DIETZI** Tanner, n. sp.

Elongate, slender. Black, densely covered with brownish-white scales; mottling or mixture of brown and white scales on the prothorax and elytra, but not in any definite pattern; small black tubercles show through the crust of scales on the prothorax and elytra. Striae shallow, intervals slightly convex; a white-topped callus on the fourth interspace at the declivity; beak as long as head; scape not quite reaching the eye; funicle seven jointed, first joint conical, second as long as the third and fourth; club elongate and as long as the third to seventh joints of funicle; prothorax longer than wide. Constricted in front, widest near the front, sides almost straight, one half the width of the elytra at the humeral angle; elytra with only one callus, declivity gradual. Legs red; tibia curved with prominent spine; third joint of tarsi narrow; fourth joint as long as the first, second, and third joints; terminal claws separate.

Length 3 mm.; width 1.2 mm.

Type Locality: Cyprus Mill, Texas. The type specimen, collected by Mr. Schuapp, is from the Dietz collection; a paratype from the Frederick Blanchard collection is also from Texas. Both specimens are in my collection at the Brigham Young University.

The specimen from the Dietz collection has been in my collection for many years as a unique. When the Blanchard specimen was received and agreed so perfectly with the Dietz one I decided to propose a name for it and place it in with the described species of this genus. *Dietzi* runs in my key to *californicus*, but is distinct in that it is a little longer and narrower in body, with prominent callus

on the fourth interspace half way down on the declivity which is tipped with white; uniform in color without a white spot; with small black tubercles on the prothorax and elytra which show through the brownish white scale covering. Short beak and long slender fourth tarsal segment. It is more slender with straighter prothorax and elytra than in *californicus* and *restrictus*.

#### ADDITIONAL DISTRIBUTIONAL RECORDS FOR SEVERAL SPECIES OF BAGOUS

Since the publication of my paper on the Hydronomi, 1943, the following species have been received and are in my collection. I take this opportunity to report on the distribution of the following species:

*B. lunatus* Blatch.

3 specimens, Iowa (Otto Lugger collector); 1 specimen, Indiana (H. Soltau collector).

*B. blatchleyi* Tanner

1 specimen, Tampa, Florida (Otto Lugger collector). The type of *blatchleyi* was deposited in the U. S. Natural Museum. This is the only other specimen of this species known to the writer.

*B. obliquus* Lec.

1 specimen, Riley Co., Kansas (Popenoe); 2 specimens, Iowa City, Iowa, June 10, 1917, (L. L. Buchanan) 1 specimen St. Augustine, Florida, (George M. Greene).

*B. blanchardi* Blatch.

1 specimen, Michigan.

*B. cavifrons* Lec.

2 specimens, Iowa (Otto Lugger collector).

*B. carinatus* Blatch.

9 specimens Palo Alto, Santa Clara Co., California (H. P. Chandler, February 9, 1946). This is a widespread species as previously pointed out by me, p. 23. This is the first time, so far as I know, that it has been reported from California.

*B. chandleri* Tanner

1 specimen, Elko, Nevada (Wickham).

*B. restrictus* Lec.

1 specimen, Franklin Co., Iowa (N. J. and E. L. Sleeper collection). 1 specimen, Narrows, Oregon.

PANDELETEIUS **BRYANTI** Tanner, n. sp.

Similar in general aspects to *rotundicollis* but smaller, covered with a crust of black and gray, subcircular and somewhat overlapping scales; the gray scales well developed on head, sides of pronotum; the two colors confined on the elytral disk; short recumbent setae inconspicuous dorsally, white ones well developed on ventral surface, and the legs; rostrum as long as the head, broadly concave, with a medium line from between the eyes. Scrobes deep, short, curved down 1 mm. in front of the eyes; antennae reddish brown, scape when extended back reaching the eye, funicle six jointed, first joint enlarged apically and twice as long as the second segment, segments 3-5 moniliform, 6th segment enlarged with a greater width than length; club as long as the four distal segments of the funicle; prothorax with equal basal and apical constrictions, sides only moderately rounded, sides with a mixture of white and brown scales, disc with dark brown-blackish scales; deeply and closely punctured; elytral striae deeply punctate, intervals flat, widest at apical two-fifths, where they are less than twice the width of the prothorax; fourth and fifth intervals coalescing and elevated at the declivity; elytra extending well beyond the tip of the abdomen; femur of the prothoracic leg greatly enlarged at the middle reducing sharply on the venter at connection with the tibia; tibia slender, uniform in diameter, and with six to eight inner margin black denticles and a distal apical spur; not suddenly bent at the extreme tip; third tarsal segment greatly expanded, emarginate, and with dense whitish setae on the pads; fourth segment slender, and as long as the other three segments combined, claws large and divaricate; femora of the meso and meta thoracic legs one third the diameter of the prothoracic leg, proximal portion of femora and all the tibiae and tarsi reddish brown in color. Legs and under surface of body with well developed white setae. Black color of the body showing through the scales.

Length of female 4.8 mm.; male 3.5 mm.

Type Locality: Davis Mountains, Texas; collected by Owen Bryant, May 9, 1951. Elevation 6700 feet. Holotype, allotype, and three paratypes in my collection at Brigham Young University. One paratype is minus the head and one front leg while another is minus one front leg. Two paratypes in the entomological collections of the California Academy of Sciences, and two paratypes in the private collection of Mr. Owen Bryant.

*Bryanti* may be distinguished from *rotundicollis* as follows: It is a smaller species with less concavity of the rostrum; segments 3-5 of funicle moniliform; prothorax not strongly dilated, with deep proximal punctures; prothoracic tibiae straight and with 6 to 8 denticles; fourth segment of tarsus as long as the three preceeding ones; claws divaricate; femora greatly inflated. Black color of the body showing through the scales which are fewer and less compact on the dorsal surface. No definite scale pattern as in Fall's species.

The species of *Pandeleiteius*, which have six segments in their antennae, may be separated with the following key:

1. Antennal funicle six-jointed
  - A. Head and beak in front of eyes deeply concave; thorax strongly rounded at sides; rostrum triangularly emarginate and rather long; first joint of antennae about as long as the next two; second subequal in length to but not wider than the next. Two outer joints submoniliform and gradually slightly wider; anterior tibiae suddenly a little bent at the extreme tip ..... *rotundicollis* Fall.
  - AA. Head and beak in front of eyes concave, not so deeply as in *rotundicollis*, joints of funicle pale, first enlarged, longer than the next two, next three joints moniliform; anterior tibiae straight, not bent at extreme tip; front tarsi enlarged, claws large and divaricate ..... *bryanti* n. sp. Tanner
  - AAA. Head and beak in front of eyes only slightly concave with median impressed line; apex slightly emarginate; joints of funicle elongate; front tarsi not enlarged, claws small and slightly divergent ..... *defectus* Green

**ONYCHYLIS ESSIGI** Tanner, n. sp.

Opaque black, with a very thin gray covering which does not obscure the deep black of the body; legs, antennae and apical portion of beak reddish brown; beak as long as the head and thorax; slightly expanded beyond the origin of the antennae, which is two-thirds the distance of the beak from the eyes; scrobes bordered by a gray covering of whitish scales; scape reaches the eye, funicle six segments, as long as scape, first joint conical, second longer than the third and fourth combined; club compact, setaceous and as long as third, fourth, fifth, and sixth segments combined. Prothorax as long as wide, constricted in front, and rounded on the sides; surface uniformly covered with contiguous punctures. Elytra one-third wider than the prothorax; humeri oblique and rounded; slightly depressed back of the humeri; striae fine, intervals only slightly rounded; entire surface with shallow, angular punctures; setae sparse; declivity regular, without callus. Legs long; tibiae curved with a well developed apical spine; tarsi four segmented, third deeply emarginate;

fourth longer than the third and with two long separate claws.

Length 2.4 mm., width 1.3 mm., beak 1 mm.

Type Locality: Saratoga Springs in Death Valley, Inyo County, California. Collected by John N. Belkin in the spring of 1955. I am pleased to deposit the types of this species as follows: type, and three paratypes in the collection of the California Academy of Sciences, San Francisco; three paratypes in the entomological collection of the University of California at Berkeley; four paratypes in the entomological collection, College of Agriculture, University of California at Los Angeles; and five paratypes in the author's collection at Brigham Young University.

A comparison of *essigi* with the described species of this genus - *alternans*, *nigrirostris*, and *longulus* - reveals the following differences: *essigi* is the smallest species and yet the beak is longer in proportion to its size than in any of the other species; the small punctures of the prothorax and elytra are distinctive; a lack of elevation of the striae; a lack of setae, as in *alternans*; the lack of a crust of scales which gives the specimens a mottled color appearance in many cases; and the opaque black color of the fourteen specimens before me are distinguishing characteristics of this species. *Nigrirostris* is most closely related to *essigi*.

It is a pleasure to name this species, since it is known only from California, in honor of Dr. E. O. Essig, a distinguished entomologist who has contributed greatly to the science of entomology in the western United States through his effective teaching and authorship of several indispensable books on western insects.



## A NOTE TO COMMEMORATE THE ONE-HUNDREDTH ANNIVERSARY OF KOCH'S DIE PFLANZENLÄUSE

F. C. HOTTES

Grand Junction, Colorado

Since 1954 marked the one-hundredth anniversary of the publication of the first Heft, and since 1957 will mark the one-hundredth anniversary of the printing of the ninth and last Heft, and the publication of the work as a whole, of Koch's *Die Pflanzenläuse*, perhaps it is fitting that we review briefly the manner in which this work was published. Furthermore I believe I have discovered something new concerning the publication of this work, and although trivial, believe it of interest. I offer it herewith, to commemorate the one-hundredth anniversary of the publication of this work which had such a profound influence on Aphid Taxonomy.

I suspect that few of the younger Aphid Taxonomists are aware of the fact that Koch's *Die Pflanzenläuse* was originally published in nine parts or Heften. Few in America, surely have access to the volume thus published. It appears to be terribly scarce even in Europe, where only a few copies appear to have been published. Even the volume printed in 1857, as a whole is rare and high priced. It is this volume which most American Aphid Taxonomists are familiar with. Its contents are the same, as that of the volume issued in parts, bound volumes of which are apt not to show evidence of interrupted publication, only the first part being indicated.

Because a number of new genera and species were described in the parts as issued, it is important to know the date of publication of each Heft, so that the new forms may be associated with the date of issue, and not the date of the completed work, as is so often done.

Inasmuch as Hagen, 1862, Horn and Schenkling, 1928, and Börner, 1952, are either not clear, accurate or complete in their reference to the publication of the various Heften, and because none refer to the publication of the work as a whole in 1857, a review may be of value to younger workers, despite the fact that my Old Mentor Dr. O. W. Oestlund covered much of the same material in a paper published in *Entomological News* in 1910. The paper, also partly obscured by time deserves to be better known. Oestlund gives the dates and pages for the Heften as follows: "Parts 1-4 issued in 1854. Heft 1, pp 1-8 and 1-36, Heft II pp 37-72, Heft III pp 73-



100, Heft IV pp 101-134. Parts 5-7 were issued in 1855. Heft V pp 135-166, Heft VI pp 167-196, Heft VII pp 197-236. Parts VIII and IX were issued in 1857. Heft VIII pp 237-274, Heft IX pp 275-336.

We of this generation, because we are more apt to have access to the volume issued in 1857 as a whole, are likely to learn that the original volume was issued in nine parts on page 328 in a section written by J. H. Kaltenbach. This is also found on page 329 (if numbered) of part nine. Dr. Oestlund states that the plates issued with the Heften are superior to those issued with the volume published in 1857. I have the volume Dr. Oestlund had, before me, and one other consisting of eight parts, and the plates for the same. I agree with the observation made by Dr. Oestlund. The plates issued with the Heften are superior. The superiority lies largely in the manner in which small details of color and pulverulence are shown. The 1857 copies showing pulverulence poorly, if at all. I have seen the plates of four volumes, they, as is true of most hand colored plates, have one thing in common. They differ. This is true even for the plates issued with the Heften. Dr. Oestlund further states, "The number of copies distributed in parts was probably small and on the completion of the work in 1857 the greater part of the edition was united into one with a new title page dated Nürnberg, 1857, in which condition most of the copies now to be had are found."

Evidence I shall now present, and believe to be new, contradicts this statement. The new title page mentioned by Dr. Oestlund differs from the title page of the volume issued as a whole in 1857 not only in style of print, and size of print but carries the name of the publisher, and the name of the printer on the reverse side. The names of the publisher and the printer are absent on the title page of the volume printed in 1857.

When one is fortunate enough to be able to compare a volume issued in Heften with a volume issued complete, and I have been fortunate to be able to compare two of each, other differences become apparent. For example, the style of type used in the printing of the various Heften differs from the style of type used in printing the volume as a whole. Although there is a great resemblance between the two styles of type, the type used in the printing of the Heften is somewhat bolder, it also differs slightly in size. Words printed in *italics*, such as some specific names are also in a different type in the two editions. Names of genera and species although

printed in the same style of type, are printed in different sizes. This is strikingly shown on page 275. There is a striking difference between the two issues, except in part nine, where an asterisk is used. This may be noted by comparing page one of Heft one and page one of the 1857 issue. That used in the Heften is made up of six individual parts, that in the 1857 issue has the parts united by stems. Commas in the Heften are faint, and the tail rather thin and curved, those in the 1857 work are thicker, and have the tail less curved. Although I suspect that the work issued in 1857 was set into type from the printed pages of the Heften, the word content of given lines is not always the same. In fact the word content of a given page may differ by three or four words, or in the case of page 328 of Heft nine where this is found page 327. In no case is the word content of a given page enough to change the page of the description of a new genus or species. Some pages have line content of the two editions the same, this is well illustrated by the first two or three pages of Heft nine. The capital letter Q used in the two editions is not the same, that used on page 227 of Heft VII has the bar under the O, that used on page 227 of the 1857 edition has the bar across the O. I found only one feature which may be viewed as a typographical error. The figure 345 on page 270 of the volume printed in 1857 lacks a period after it, such is present in Heft VIII of the same page.

Because the paragraph on page 328 of Heft nine is printed on the bottom of page 327 of the 1857 edition, the remaining pages of text and index are not the same. Furthermore, the species and genera listed on the second and following pages of the index are not the same in the two editions. Nor has the 1857 edition the announcement of books for sale on page 336 (if numbered).

Therefore I think the volume issued in 1857 as a whole, should be thought of as a reprint edition, and not as an equal to the volume issued in parts. Furthermore I suspect that if we wanted to be technical we might regard the genera and species indicated as new in the 1857 volume as homonyms and synonyms of those described in the Heften.

After a time lapse of a hundred years, speculation as to the reason for a complete new resetting of type for the volume issued in 1857 is rather risky. One suspects that the printer could not afford to keep such a quantity of type idle for a period of two or three years. Hence after the Heften were in print, the plates from which they were printed were reduced to type, so that the type could be reused. It is strange, however, that parts VIII and IX both

issued in 1857 should have to be reset. Perhaps there was a greater demand for the work than first contracted for, in the form of Heften, hence the reprint edition. The fact that different type was used in the printing of the two editions, first suggested to me that different printers were involved.

Dr. Hans Sachtleben, Director of the Deutsches Entomologisches Institut, has kindly supplied me with the following additional information. Their volume of Koch's work which was issued in Heften, has the covers of all except the ninth Heft bound in. The cover of the eighth Heft carries the date 1856.

This Heft should therefore date from 1856 and not 1857. The genera *Cladobius*, *Toxoptera* and *Pachypappa* were described in this Heft, and should therefore date from 1856 and not 1857. Only the genera *Toxoptera* and *Pachypappa* are good, the name *Cladobius* was preoccupied. Börner, 1930 gives the date of these genera as 1856.

Dr. Sachtleben sends the following information which all Aphid Taxonomists will find of interest. He states that the Museum of which he is Director has possession of many of the original drawings of Koch.

SOME OBSERVATIONS ON THE ROSTRUM  
OF *CINARA PUERCA* Hottes (Aphidae)

F. C. HOTTES  
Grand Junction, Colorado

In the original description of *C. puerca* I mention an interesting condition of the rostrum of this species, which I have since found in several other species of the genus. It is the purpose of this note to add additional information, and again call attention to this condition, in the hope that others more qualified than I will carry on a more complete investigation.

The interesting condition to which I have been unable to find a complete description in the Aphid literature in my library, may be best introduced by briefly describing the rostrum, which may also be referred to as the labium or proboscis. The rostrum in the genus *Cinara* consists of five segments. When the specimen is moving about or not feeding, the rostrum lies against the ventral surface of the body, extending between the coxae for various lengths, depending upon the age of the individual and the species to which it belongs. In the feeding position in the genus *Cinara* the rostrum extends forward from the body. It is common for specimens of this genus to form a sort of tripod, making use of the rostrum and prothoracic legs when feeding. When so doing the abdomen is elevated, moved from side to side and the meso and metathoracic legs kicked about. This reaction may be a response to temperature. It is more rapid when the temperature is high, and is not indulged in under cool conditions.

The proximal segment of the rostrum is pale, very thin, and flexible. In *Cinara* this segment appears to have an open groove along all but its most proximal dorsal region. It may be questioned if such a groove is for the reception of the stylets, for I have never seen them in it. I have not seen this groove in section, and it may not exist, if present, it is indicated by a pale line, bordered by light dusky.

It is possible that what I take for a groove, is a region along the dorsum of the segment where the chitin is very thin and hence paler. If present I suspect it is for the purpose of expansion of the segment. The second segment of the labium is somewhat longer than the first, smaller in diameter, and much more thickly chitinized. In *C. puerca* and many other species of *Cinara* the ground

color of this segment is pale, on this there are superimposed deeply pigmented areas, which vary in size and arrangement, the spots often becoming more or less confluent. The zone of junction between the first and second segments of the labium is clearly indicated, but it should be noted that the more highly chitinized lateral margins of the dorsal groove of the second segment continue within the first segment for a short distance. There appears to be a third highly chitinized rod within the second segment, perhaps in the mid ventral region of the dorsal groove. The dorsal groove extends the full length of the second segment and is open. The third segment of the rostrum is much shorter than the second, as a rule it is quite thick, and always highly chitinized, its dorsal groove is open throughout its length. The fourth segment of the rostrum is much like the third, in length, but it is narrower and tapers towards the apex, its dorsal groove is open throughout its length in *C. puerca*. The fifth segment of the rostrum is very short, highly chitinized and sharp pointed, its groove is inclosed. This segment has a few tactile hairs near the end.

Many specimens of *C. puerca* and some other species of the genus *Cinara* show the following interesting condition of the rostrum. The second segment of the labium, which it will be recalled is spotted, and therefore easily noted, telescopes within the first segment. This process which may be viewed in many stages, consists of the second segment being pushed into the first. To accomplish this the apical portion of the first segment is rolled inwards, as the second segment is pushed in. Thus for a time the second segment becomes in part surrounded by a double walled tube, formed from the first segment. This process may continue until the "posterior" ends of the two segments are in the vicinity of the metathoracic coxae. When this position is reached all of the first segment and a large portion of the second segment lie within the body. The two chitinous rod-like structures proximal to the zone of junction extend beyond the posterior limits of the first segment, and often appear to merge at a point, the third rod being median to them. When the ends of segments one and two lie in the vicinity of the metathoracic coxae, the entire surface of the first segment has been reversed. This is indicated not only by the position of the chitinous rods at the zone of junction, but by comparing the length of the extended first segment, with that pushed into the body.

Davidson, 1914 describes the withdrawal of the first segment of the rostrum within the body of *Schizoneura lanigera*, but he does



not state the extent to which this takes place. I assume that it is not far. He makes no mention of the invagination of the first segment by the second. Davidson mentions protractor muscles responsible

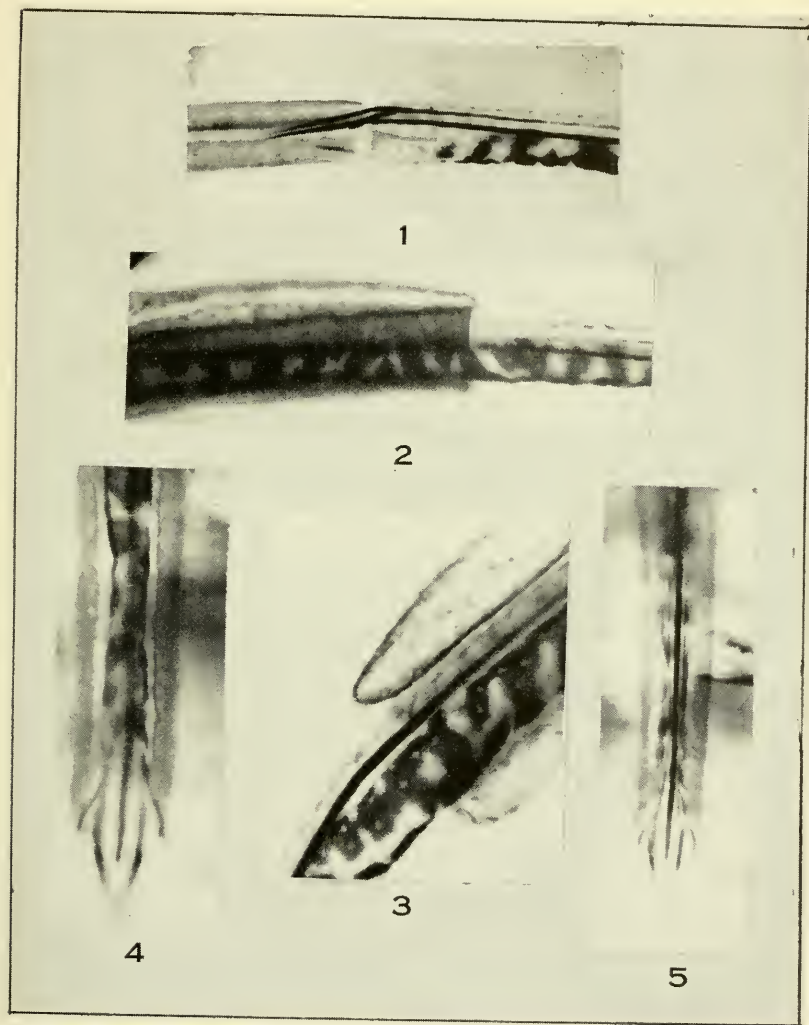


Fig. 1. Zone of junction between segment one and two. Note chitinous rods which extend within segment one, these form the lateral ridges of the open trough within the second segment on the dorsal side.

Fig. 2. A portion of the second segment is shown within the first.

Fig. 3. The second segment in process of being pushed within the first. The top section of the first segment is out of focus,



hence this shows a portion of the first segment as if it were in section. Note how the first segment is "rolled" in.

Fig. 4. Segment two of the rostrum has been pushed within the first segment, causing the surface of the first segment to be reversed, both segments are now within the abdomen, the first segment forming a sheath about the second, note how the citinous rods extend beyond the apex of the first segment.

Fig. 5. Same as figure four. In both figure four and five the top of the first segment has been made out of focus, so as to show the second segment better, both of these photos have been made through the body wall.

for the withdrawing of the phoboscis within the body. I have made no dissections, hence have not seen such, I do however question if they are present. This belief is strengthened by the knowledge that the entire surface of the first segment is reversed, when the second segment lies within it. If one may hazard a guess the process may be quite simple. The specimen by means of the tactile hairs at the end of the fifth segment of the proboscis may select a suitable location for penetration, establish a firm contact, and move the body forward. In so doing cause the second segment to carry back the first. This process would also serve to embed the apical segments, within the tissue of the host, the process reversed would free the rostrum, as well as extend it.

I first noted this telescoping effect in freshly killed alcoholic material of *C. puerca*. I have since noted it in living specimens in nature, so far as the unaided eye may be relied upon to note such a small feature. But it should be noted that the fully extended rostrum of *C. puerca* exceeds the length of the body, so that a reduction in length by half or more of the rostrum should not be too difficult to note. I have observed this condition under the binocular microscope in two specimens which I have been rearing, but I could observe only the third segment and a portion of the second. The specimens were feeding, and the fourth and fifth segments were embedded in the bark. This observation showed the stylets within the dorsal groove of the exposed segments, and raised the question as to their position in more proximal regions of the proboscis. Thus by partly answering a question another question is asked. Nor would I fail to ask the purpose of the telescoping. Can it be for the purpose of strengthening the first two segments, so that the fifth segment can be forced into the host tissue?

Dr. D. Hille Ris Lambers has called my attention to page 14 of Tullgren, 1909, where a similar condition is described for the genus *Stomaphis*.

THE TYPE LOCALITY OF *TRIODOPSIS CRAGINI* CALL  
(PULMONATA: POLYGYRIDAE)

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University of Utah

and

LOTTIE O. ROSCOE

The geographic designations of many of the type localities of mollusks described from the United States prior to the early part of the 20th century are rather indefinite. During this period an author would not infrequently designate an entire state or even a group of states as the type locality. The collector of the present day is fortunate in having at his disposal accurate, detailed yet inexpensive maps for over 50 per cent of the area of the United States—the U. S. Geological Survey topographic sheets. The use of these maps or of numerous other types available from both Federal and State agencies affords little excuse for poorly located type localities at the present time.

In some instances, however, what seemingly appears to be a fairly precisely designated locality proves on further examination to be somewhat difficult to subsequently relocate. Such a case is the subject of the present paper.

*Triodopsis cragini* Call (1886) was described from specimens collected by F. W. Cragin along the "Banks of Chetopa Creek, Neosho County, Kansas." This stream is not named either on the Kansas State Highway Commission map of Neosho County (1940 edition) nor on the USGS topographic sheet of the area (Parson quadrangle, 1884). The accompanying map (Fig. 1), reproduced here for the benefit of those desiring to collect topotypic material, is based on one prepared by the Kansas Geological Survey (Schoewe, 1944).

In an effort to more precisely relocate the type locality of *T. cragini*, the Thayer area was visited briefly by Robert W. Reese, Glenn R. Webb and the senior author in the fall of 1950. Specimens were obtained from the SE $\frac{1}{4}$  SW $\frac{1}{4}$  sec. 36, T. 29 S. R. 17 E. (specimens in KU Coll.). Webb (unpublished field notes) obtained additional specimens in July 1951 from "sec. 31, about  $\frac{1}{2}$  to  $\frac{3}{4}$  mi. SSW from Thayer" (Webb Coll.), and from "sec. 12 and 7, R. 18 E, T. 30 S" (KU Coll.). This latter citation is apparently a *lapsus calami* for sec. 7, T. 30 S, R. 18 E, and sec. 12, T. 30 S, R. 17 E.

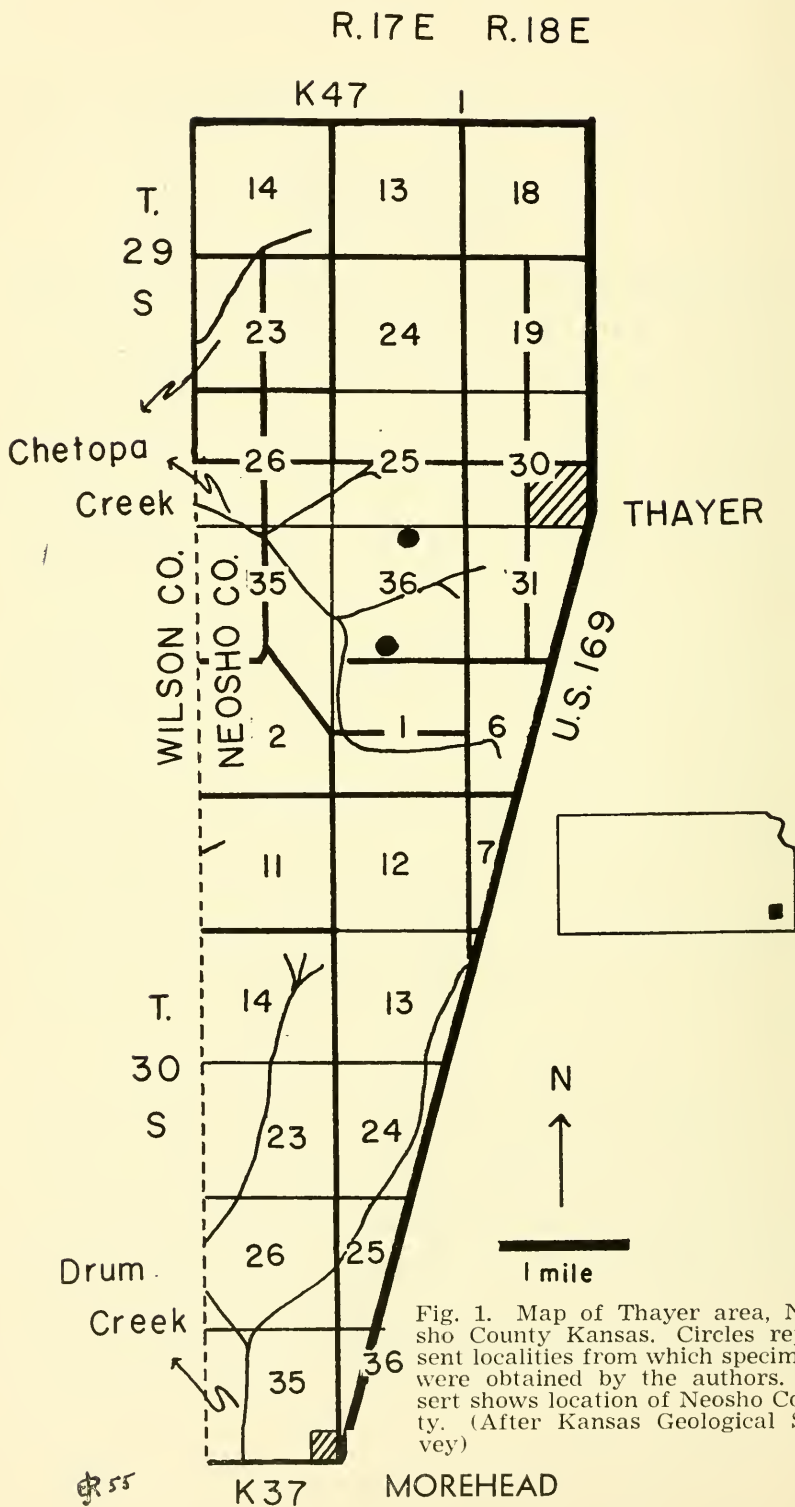


Fig. 1. Map of Thayer area, Neosho County Kansas. Circles represent localities from which specimens were obtained by the authors. Insert shows location of Neosho County. (After Kansas Geological Survey)

An extensive search by the present writers along Chetopa Creek in both Wilson and Neosho Counties in September 1952 resulted in obtaining specimens from only one locality, *viz.*, NW $\frac{1}{4}$  NE $\frac{1}{4}$ , sec. 36, T. 29 S, R. 17 E (KU Coll.).

On the basis of available information no restriction of the type locality can be made at this time. We believe, however, that it lies somewhere within sections 25, 30, 31 and 36 of T. 29 S, R. 18 E.

In the Thayer area *T. cragini* appears to favor upland situations, being found under stones and around rock ledges. In the areas investigated by us, and from which these snails were obtained, the soil is quite sandy and the upland vegetation is primarily oak. It would appear that *T. cragini* is better adapted to the less humid environments than most of the other mid-western members of the Polygyridae.

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# ADDITIONAL RECORDS OF *HELIX ASPERSA* MULLER FROM UTAH

The occurrence of this snail in Utah was first reported by Knight (Nautilus, 65:75-77, January, 1952) based on specimens collected in Ogden, Utah. During the summer of 1953 *H. aspersa* was observed in considerable numbers at 231 D St., in Salt Lake City by Mrs. Laree Poe who kindly gave the writer a number of the living animals. Mrs. Poe informed me that the snails were found on the lawn and among violets and lilly-of-the-valley. The snails were observed by her to feed on all of these plants, but her impression was that they were particularly 'fond' of the lilly-of-the-valley. Aestivation was noted to occur in a clump of lilacs although the snails were not observed to feed on this plant. At the time of collection, June 29, some individuals were observed in the process of laying egg masses. I kept specimens in a terrarium for three weeks subsequent to that time but no further deposition of egg masses was observed.

Measurements of the shells of the specimens deposited in the University of Utah Molluscan collection are given below. The banding pattern is typical, i.e., 1(23)45, and as in the case of the Ogden material closely resembles the figures of the California specimens given by Pilsbry (1939, Land Moll. N.A., 1, pt. 1:4, Fig. 3b.)

SHELL HEIGHT mm.	SHELL DIAMETER mm.	ESTIMATED AGE
25.6	25.1	Sub-adult?
26.0	25.3	Adult
26.7	25.7	Sub-adult
27.3	26.2	Adult
27.9	27.7	Adult
28.2	27.1	Adult

Nothing is known as to the mode of introduction nor the length of time the snails have been present at this Salt Lake City locality. Dr. Seville Flowers, after observing these specimens, informed me that he has noted the same kind of snails in his garden at 208 Douglas Ave., Salt Lake City for at least the past fifteen years.

The possibility of successful colonization in Utah by this snail is important because of its ability to inflict considerable damage to home and commercial vegetable gardens.

—Ernest J. Roscoe, University of Utah

**THE SOUTHWESTERN RESEARCH STATION  
OF  
THE AMERICAN MUSEUM OF NATURAL HISTORY**

The American Museum of Natural History has announced the establishment of the Southwestern Research Station. It is located on the eastern slope of the Chiricahua Mountains, near Portal, Cochise County, in southeastern Arizona. The property is within the limits of the Coronado National Forest at an elevation of 4500 feet.

The station was established for the purpose of making available research facilities for scientists and students in all branches of science, who have problems that can be investigated through the utilization of the faunal, floral and geological features of the area. It will be open during the entire year.

It is operated by the American Museum of Natural History, Central Park West at 79th Street, New York 24, New York and under the direction of Dr. Mont A. Cazier, Chairman and Curator of the Department of Insects and Spiders, to whom all inquiries should be addressed. Anyone interested in the station should write to the above individual for the booklet which gives the details of the operation and a general description of the area.—Mont A. Cazier.



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